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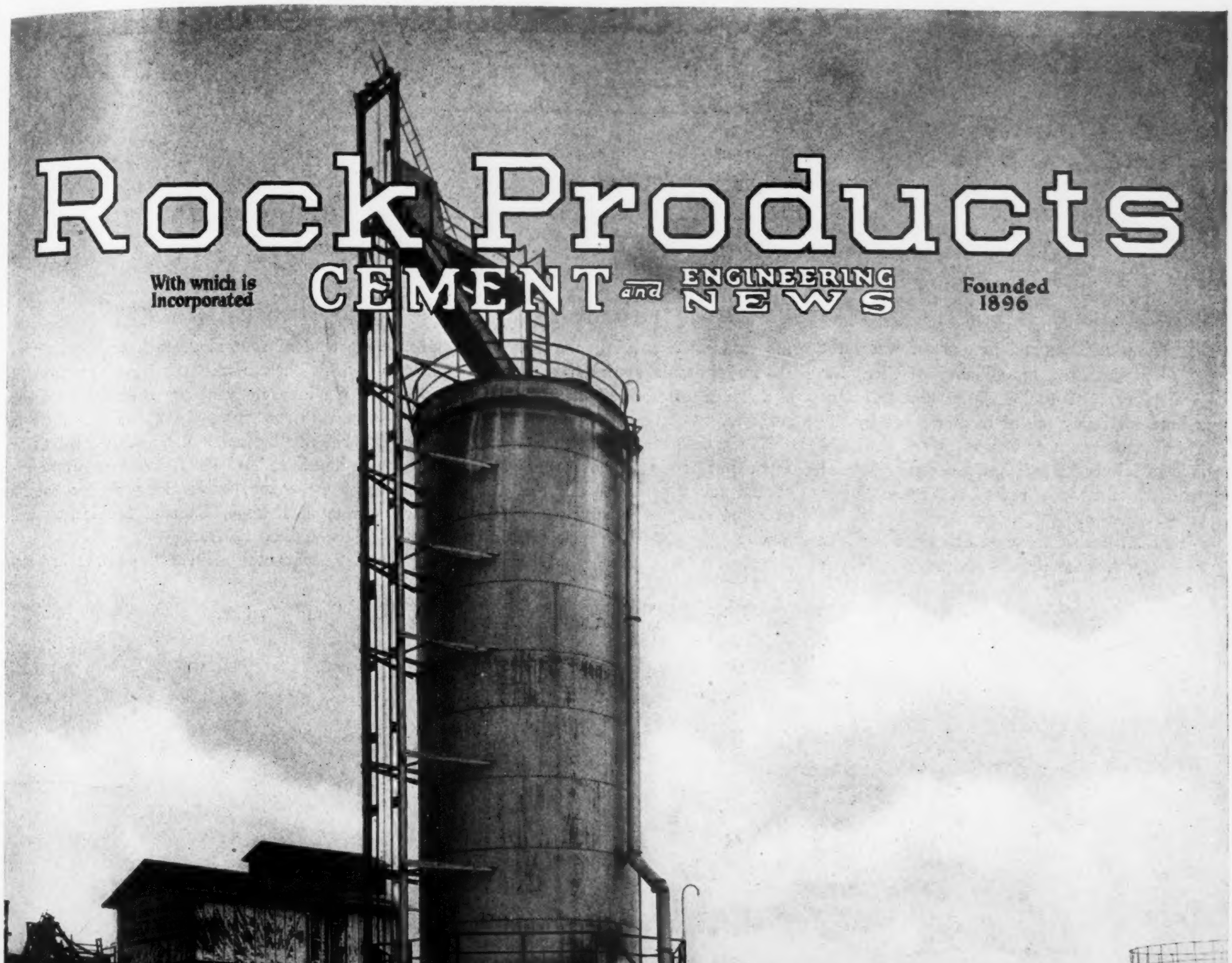


Blue Diamond Co.'s lime kiln at Los Angeles, Calif.—the only scientifically- and almost automatically-controlled lime burning operation in the United States

At Last!—A Scientifically Controlled Lime Kiln

Blue Diamond Company, Los Angeles, California, Has Made Definite Progress

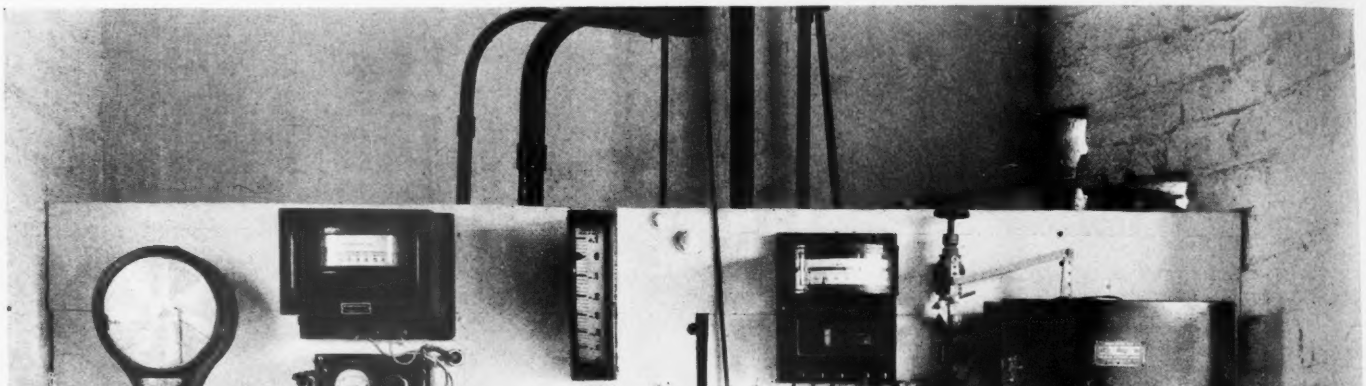
By William H. Barton
Engineer, Blue Diamond Co., Los Angeles, Calif.

THE Blue Diamond lime plant was built to produce the best quality of lime, for lime putty used for finish plaster and also a lime for ready mixed mortar made by the W. C. Hay process. It was therefore desirable to produce a soft and uniformly burned lime which always makes the most plastic putty.

Since there are no good limestone deposits near Los Angeles, it was necessary to search far and wide to find the desirable stone. Several suitable stones have been found at a distance of 250 to 300 miles from Los Angeles.

The California lime situation is different from that of almost any other place because of the fact that there are many limestones of good chemical analysis not suitable for finishing lime due to some physical characteristic. A large number of limestones over a period of several years have been investigated. These limestones have been brought to the laboratory of the Blue Diamond Co., where they have been subjected to a thorough physical and chemical analysis by the chemist, Dr. H. J. Warsap, whose experience covers work along similar lines in England, Europe, Canada, Mexico, as well as the United States.

Experimentally, these limestones in quan-



Section of instrument room showing the various indicators, gauges and automatic valves through which the lime kiln and hydrator are controlled

How lime is drawn from new Blue Diamond Co. kiln at Los Angeles

tities of 40 to 50 lb. are burned to lime in a small gas-fired kiln under various conditions, and then slaked and tested for volume of putty, plasticity, sand carrying capacity, and for hydrate. Then a particular lime is studied until a maximum set of conditions is developed, which is a standard for the operation of the larger kiln.

The kiln was located at Los Angeles so that stone from different quarries could be used. Also the best limestones are located on the desert where labor and operating conditions are not so good. The fuel situation was also a factor since natural gas was available in Los Angeles at a rate which made it preferable to fuel oil on the desert. The fact that the lime could be slaked fresh from the kiln and handled in connection with the putty plant was a deciding factor.

Designed to Burn Small-Sized Stone

The kiln was designed to burn small stone because this could be produced mechanically and with less quarry waste and because it would burn easier and more uniformly. At present the kiln is operating on stone from a jaw crusher which reduces the stone to 6 in. size and less. The stone is taken direct from the crusher without screening. The stone is shipped to the plant in large pieces, such as can be produced by blasting and small shooting, and loaded in low quarry cars by hand.

The stone is unloaded by a skip which rests on the bottom of a railroad car. A small motor-driven crane lifts the skip and swings it over the crusher. The operator dumps the rock slowly into the crusher. The rock drops on a belt and is conveyed to a bucket, or skip, which is raised to top of kiln by a motor-driven hoist. The same hoist raises the cast-iron stopper which seals the top of kiln. The skip turns over when it reaches the top and discharges the stone into a spout that delivers it to the kiln through an opening 24 in. in diameter.

Details of the Kiln

Below the opening is a conical spreader which distributes the stone on a circle half way from center to outside circumference of the storage zone.

The top of kiln is covered with slab made of cement and pumice. There is a short stack with damper accurately controlled from instrument room. There is also a thermocouple for indicating temperature of stack gases. This temperature is about 400 deg., when kiln is continuously filled with stone. The storage zone is 15 ft. in diameter and 44 ft. high.

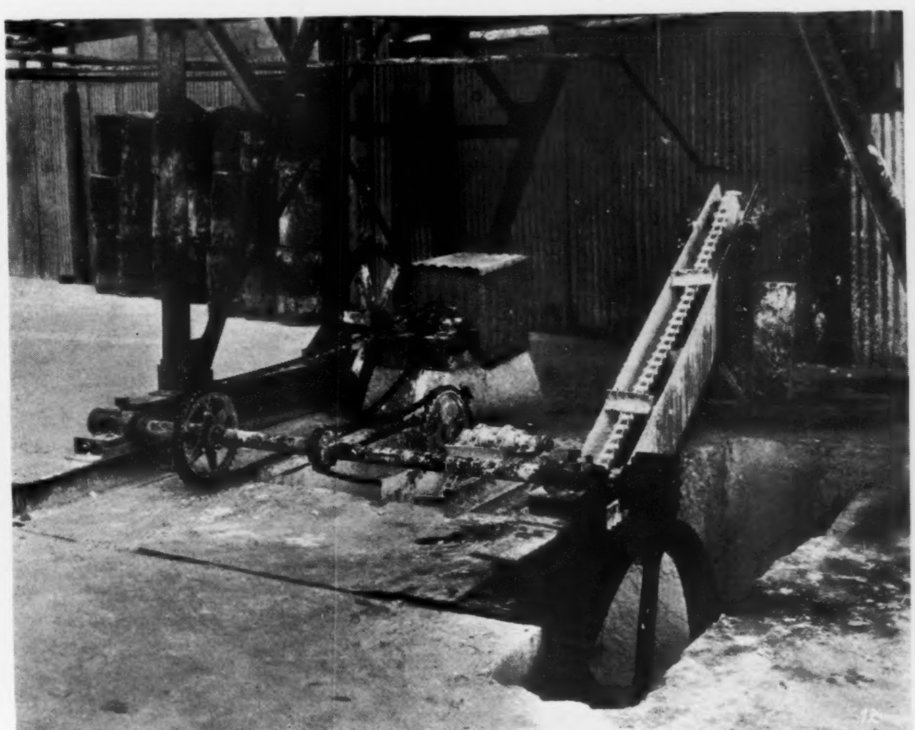
The burning zone is 12 ft. in diameter and 20 ft. high, in the center of which is a brick pier 6 ft. in diameter, which leaves an annular space 3 ft. wide for the lime. There are four brick arches from pier to wall of burning zone to partially support rock in storage zone.

The walls in the burning zone are lined with high alumina brick. The kiln was started again after seven months operation with no repairs to lining. Small repairs were made to the arches over gas inlets, which would have lasted several months without any repairs. The natural gas is fed on four quarters of kiln. When starting the fires, air is fed to gas burners from a fan, together with some stack gas, which the fan pulls from top of kiln.

When the burning zone is hot, the air valve on fan is closed and all of the air for combustion is admitted through the draw hoppers of kiln. The air passes up through the lime and is highly preheated when it reaches the burning zone. The stack gas is used to modify the flame, and the circulation of stack gas acts as a "belt" to convey the natural gas and distribute it evenly over the burning zone. It also has a bearing on the draft condition in burning zone which raises or lowers the point of burning.

Operating Methods

By the control of air and stack gas through the fan the air coming in at bottom is controlled, and the point of burning raised and lowered. There is sufficient pressure in top of kiln to force stack gas to the bottom, and it is possible that fan will be eliminated. The kiln has sufficient natural draft so that fan is not necessary in the operation.



Lime hydrator scientifically operated from the control room

By setting fan dampers, the amount of air coming in through the bottom can be controlled with a stack damper operated from instrument board. The operator is guided by draft gauge. By analyzing with an Orsat CO_2 apparatus, the proper draft can be determined to give a slight amount of excess air. The Orsat apparatus will show no unburned gases or carbon monoxide with ½ of 1% of oxygen.

The cooling zone is a continuation of the burning zone for 5 ft., and at the bottom of this are four steel hoppers which drop 7 ft., so as to feed into barrels, or wheel-barrows.

The lime is drawn into barrels, or for slaking into wheel-barrow, and dumped into a slaker, which is below floor level, at the rate of one barrel (200 lb.) every five minutes. This is at the rate of approximately 30 tons per 24 hours. The lime putty is screened and flows to a sump from which it is pumped to vats in the mortar and putty plant, which adjoins the kiln. The chain drag at end of slaker takes the core up an incline and dumps it into a barrel or wheelbarrow. The continuous slaker operates in such a manner as to deliver thoroughly slaked lime and clean core. The large core is picked out at draw hopper and returned to kiln.

Control Features

The kiln is operated from the instrument room. The operators were picked *because* they had *no experience* in burning lime. They do not know how to operate a kiln by looking at it or into it. The instrument to left of board, in the accompanying view gives the gas pressure on the burners. There is also a gas meter not shown, which gives a continuous record of the amount of gas used. The gas feed is constant for any position of a master valve, and the B.t.u. valve is also constant (about 1100 B.t.u. per cu. ft.).

The next instrument to right at top is the CO_2 indicator This is a guide as to the combustion and amount of lime being made. There is a relation between the CO_2 from the fuel and from the limestone so that the CO_2 reading indicates the fuel ratio, or the amount of lime being made at any time for the amount of fuel being consumed. The fuel ratio is based on natural gas with 1100 B.t.u. per cu. ft. and coal with 13,200 B.t.u. per lb. The figures based on perfect combustion with gas would be as follows:

LIME (LB.)	COAL (LB.)	GAS (FT.)	LIME (LB.)	CO_2
2	1	6	1	20.9%
3	1	4	1	24.6%
4	1	3	1	28.0%
4	1	2.4	1	31.2%
6	1	2	1	34.0%

The Orsat apparatus on right is used to check the CO_2, O and CO, and the stack damper controlled by wheel in center is set to allow excess of air to enter kiln. This is regulated to less than 2% oxygen in flue gas. The draft gauge shown at top center indicates the draft in cooling zone, and is a guide to operator. There is a definite draft condition for each quantity of gas consumed. The draft gauge also indicates when the cast-iron stopper in top of kiln does not seat properly.

Below the CO_2 indicator is a pyrometer which shows the stack temperature, and the burning zone temperature on the four quarters about the gas ports. At a point 18 ft. above the gas ports, the temperature of brick lining is 1600 deg. F., and flame temperature at this point is 2200 deg. F. Below each gas port is a draw hopper, so that lime is drawn according to the indicated temperature. If more lime is drawn from the quarters above the average temperature and less from those below, the temperatures stay close to the average and are not subject to sudden or serious change.

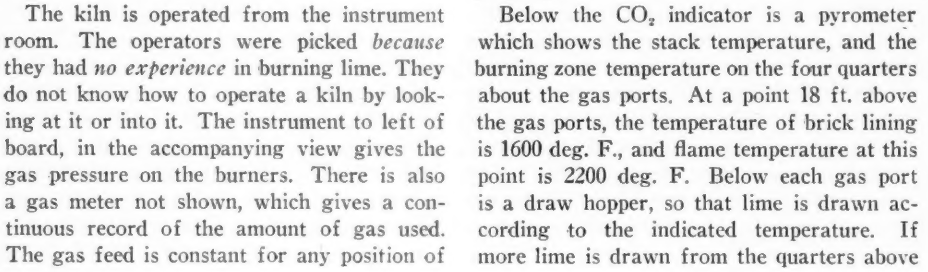
On upper right section of board is a pyrometer and automatic valve, which indicates the temperatures of slaker and admit water at any set temperature. Below is water valve and water meter in connection with the slaker.

All equipment has individual motors with switches and control in instrument room.

A form is used for recording all readings and output each hour.

Since the above description was written the gas burners have been changed, along the lines suggested in the foregoing, so as to eliminate the fan and run the kilns on natural draft, using the pressure of the gas as an injection force for air and stack gas through the burner. This reduces the control to the gas valve which is set and the stack damper, which follows the draft gauge. The drawings are now governed by the temperature readings in the burning zone.

The brick lining of the burning zone was found to be in very good condition, and no repairs were necessary. With carborundum brick over the gas inlets it is believed this kiln would operate two years without shutting down for repairs. Plans are being made to equip the kiln with oil burners for experimental and further research purposes.



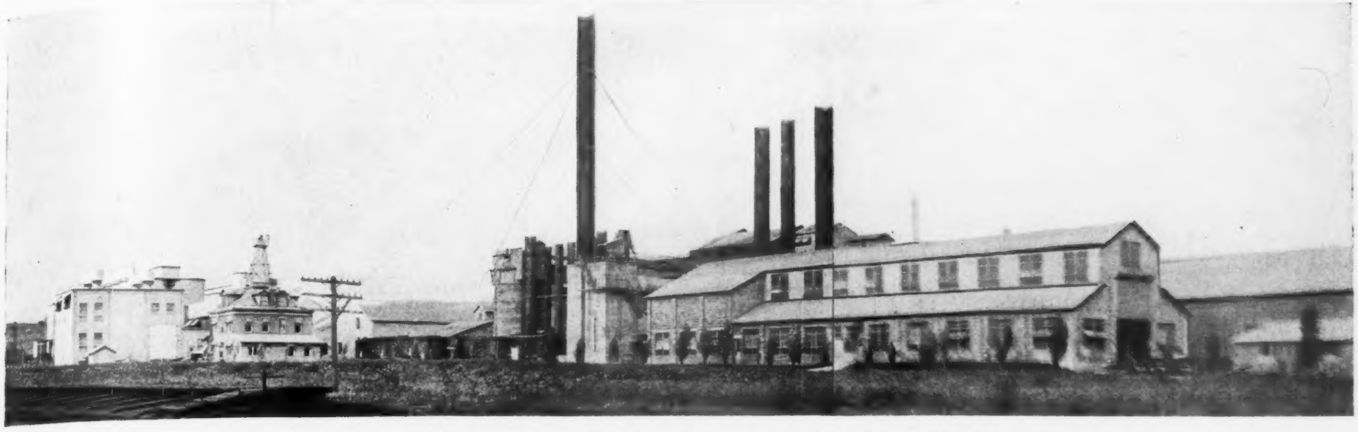
Showing the relation between the percentage of CO_2 recorded and the gas pressure. The CO_2 reading has been interpolated to directly indicate the fuel ratio at any time

Discussion of Lime Hydration at Lime Symposium

ONE of the most important problems of lime manufacture, and one which is fascinating to the chemist is that of hydration. This subject will be discussed during the lime symposium at the Richmond meeting of the American Chemical Society by F. W. Adams, director of the Bangor, Me., station of the school of chemical engineering practice of Massachusetts Institute of Technology.

The properties of hydrated lime and milk of lime are of extreme importance in the many industrial processes using these reagents and Mr. Adams has been engaged during the past two years on a systematic investigation of the requirements of the hydrate for certain uses and the conditions affecting its properties. The conditions studied include those affecting particle size, settling rate, reactivity, and plasticity. Other investigators have studied the relation of conditions of burning and properties of quicklime and the effects of certain salts on the slaking or hydrating characteristics. All of these will be discussed.

Other interesting problems of lime manufacture will be covered by special papers to be presented during the symposium. These include "X-Ray Studies of Lime" by Marie Farnsworth, "Rotary vs. Shaft Kilns" by R. K. Meade, "The Function of Steam in the Lime Kiln" by E. E. Berger, and "Lime Kiln Fuel Efficiencies" by V. J. Azbe.



A recent view of the Lawrence Portland Cement Co.'s mill at Siegfried, Penn.

Recent Improvements Made by the Lawrence Portland Cement Company

Sweeping Changes Made at Quarry, Crushing Plant and Mill—Novel System of Storing and Handling Supplies

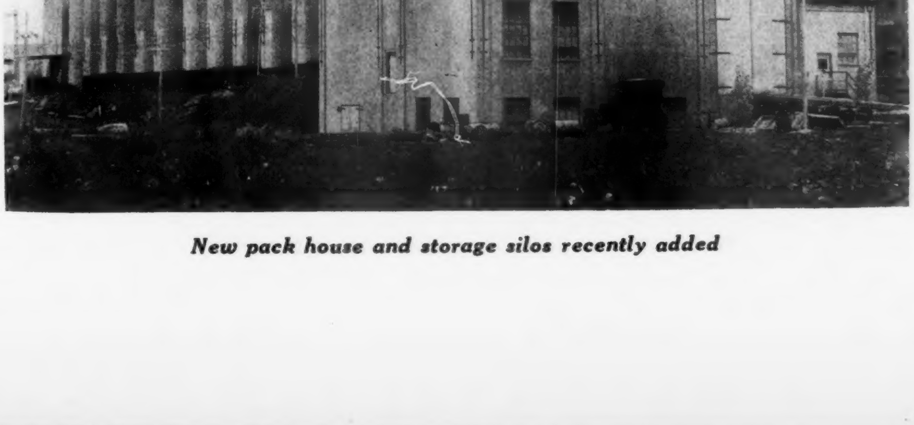
THE Lawrence Portland Cement Co. of Siegfried, Penn., is one of the pioneer cement manufacturing companies of the United States. The first cement plant at Siegfried was started in the year 1866, as the date on the gate posts at the entrance of the plant attests. During its long life it has confined its operations to a single plant, but it has built and rebuilt, putting in new equipment and abandoning the old, and expanding and improving always, to keep in pace or a little ahead of the progress of the industry. Today it is rated among the largest plants in the Lehigh Valley, and indeed it is one of the largest in the country, for the production in 1926 was well on toward 3,000,000 bbl.

When it began operations 40 years ago it made natural cement, burning the same rock, from which portland cement is made today, in shaft kilns that resembled lime kilns. It still makes an improved natural cement and much of it, because in later years the demand for it, to use in stone masonry and brick construction, has grown very strong. It is sold under the brand name of "Hy-test" cement by the Hy-Test Cement Co. over a good part of the United States. In fact, the demand for it has recently been so great that some of the most important plant improvements made during the past year were to increase its production. But of course much the greater part of the output of the Lawrence company is portland cement which is sold under the brand name of "Dragon."

One of the recent improvements made by the Lawrence company is the new packing and storage plant which was described in ROCK PRODUCTS, issue of September 4. In addition it has built a transformer station and power plant, big enough to serve a fair sized town, and has changed over all its motors from 25-cycle to 60-cycle equipment. It has added dust collector systems which have not only reduced the dust going into the air, always present when cement is manufactured by the dry process, but which have proved themselves to be money savers. It has installed the first rotary kiln to burn natural cement and built a large storage plant in which to store the product. These are all 1926 improvements. A little earlier it made improvements in the quarry and crushing plant which have increased both the efficiency and the output of these units. And not the least interesting of the improvements to this plant is the system of storing and handling supplies, which is so simple that even an untrained man can find anything that is wanted, while a well-checked perpetual inventory system prevents any possibility of shortage or over-accumulation in supplies.

The Quarry

The quarry is a half-mile from the plant and it is the deepest quarry in the cement district of the Lehigh Valley, the face averaging 138 ft. in height. It is near Hokendauqua creek, so near that the bed of the creek had to be changed to permit the work to advance, and it is probable that it will have to be changed again. Borings have shown the rock to go to a depth of 275 ft., according to the Pennsylvania Geological Survey's report, the $CaCO_3$ content in-



New pack house and storage silos recently added

Section of the quarry face which averages 138 ft. in height

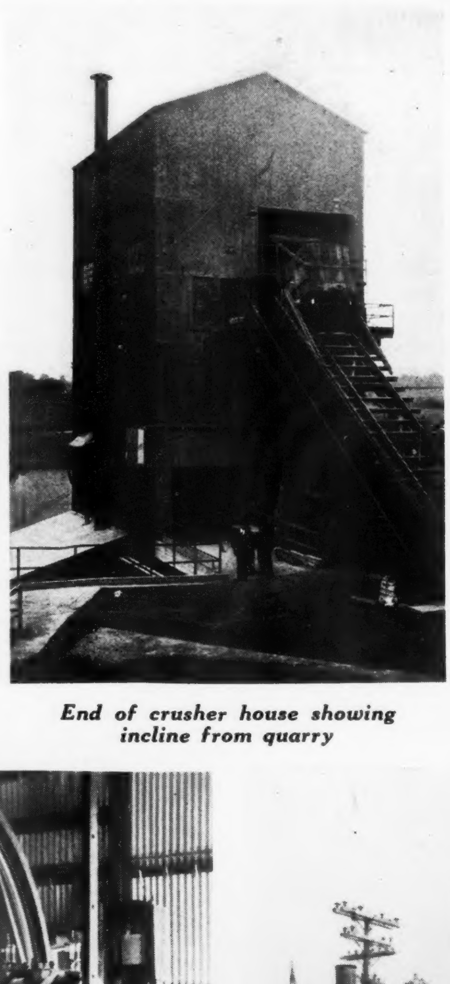
Well drill putting down 6-in. holes

creasing slightly with the depth.

The rock is not hard and the Sanderson-Cyclone well drill employed can put down 50 ft. of a 6-in. hole in a day. The holes are shot in groups in the usual manner and the rock is loaded into quarry cars with two Atlantic steam shovels.

The crushing plant is set well above the quarry and the two are connected with an incline which pitches about 45 deg. The rock is hoisted up this incline in 12-ton skips by a hoist of the remote-control type made by the Vulcan Iron Works. It is driven by a 350-hp. Westinghouse electric motor through a system of automatic contactors. One operator is needed, the whole operation of raising and dumping the skip and returning it to the foot of the incline being controlled by one man at the head of the incline.

Skips are dumped directly into the hopper of the primary crusher which is a Fairmont (Allis-Chalmers) single roll 36x60 in. driven by a 150-hp. motor. This machine would seem to be very well adapted to the crushing of this kind of rock, for it takes large pieces and breaks them quickly. Only a small part of the time elapsing between the arrivals of skips at the hopper is actually consumed in crushing. From the Fairmont roll the rock passes to a Williams hammer mill which breaks it to the right size for the Bradley pulverizers and Smidth tube mills that prepare it for portland cement.

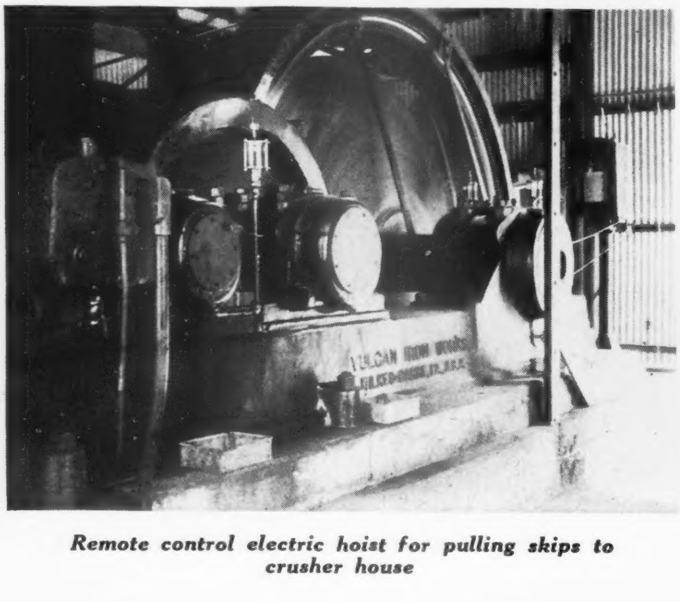


End of crusher house showing incline from quarry

For portland cement the rock is taken from the hammer mill by a 30-in. belt conveyor on an incline to the raw rock storage. This storage is one of the largest in the field and is partly under cover and partly in the open. The under-cover storage is sufficient to carry on the plant during extremely bad weather. In the summer the stone usually requires no drying, but in the winter it is dried in four dryers. The rock is pulled into the plant from the storage in 50-ton cars by a 24-ton Plymouth gasoline locomotive.

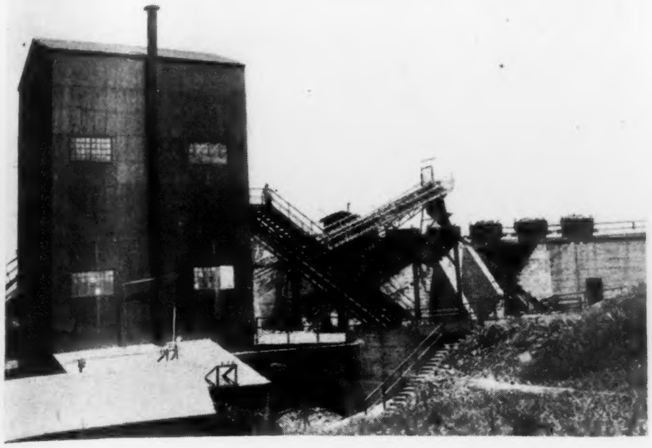
Making "Hy-Test" Cement

When the plant was visited to obtain the notes for this article, the rotary kiln for making "Hy-test" cement was not yet in



Remote control electric hoist for pulling skips to crusher house

Gasoline locomotive which brings cement rock from the quarry



Another view of the crushing plant

Open storage pile of cement rock

operation. The rock to make it was being burned in the 16-shaft kilns that are one of the oldest parts of the plant. These kilns are 9 ft. in diameter and 30 ft. high, made of plate steel and lined with fire brick. Arches at the base permit the burned rock to be drawn from the kilns by a power loader into hoppers over a drag-chain conveyor by which it is conveyed to the grinding plant.

The kilns are charged very simply by dumping the rock into them from a side-dump car. An ingenious device is used to get the rock over to the far side of the kiln, a little inclined platform that receives part of the rock that falls from the car and sends it to the far side of the kiln. The fuel used is "buckwheat" size anthracite coal which is spread by hand over the rock after each car has been dumped. The fuel ratio is said to be low, as it would naturally be with this kind of a kiln and burning such a material.

In addition to the 16 kilns used for burning cement rock there are two kilns of the same size and type burning dolomitic limestone. The product of these is mixed with the burned cement rock before grinding.

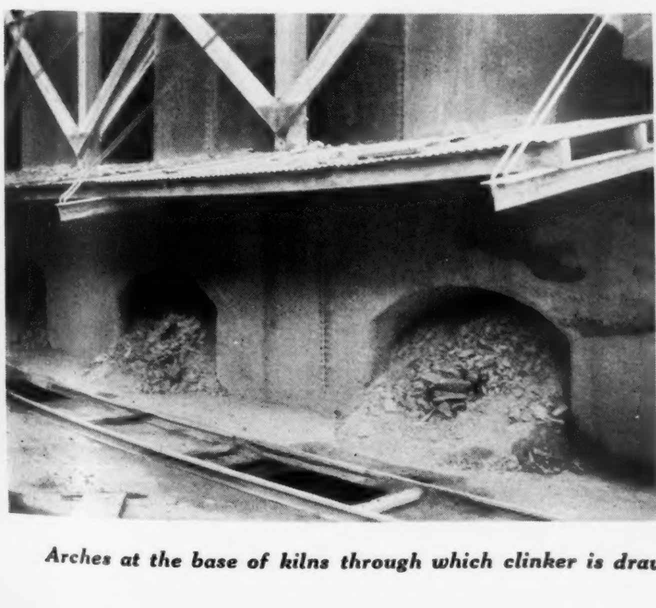
This cement is ground in three No. 16 Smidth tube mills. It is much easier to grind than cement clinker, but it is ground to a considerably finer product (95% through 200-mesh).

Battery of shaft kilns in which natural cement has been burned for more than 40 years

The new rotary kiln for burning natural cement does not differ essentially from the rotary kilns used in burning portland cement. It was made by the Traylor Engineering and Manufacturing Co. and is 180 ft. long and 9 ft. inside diameter. It is stiffened with two rings and has two points of support with the usual drive. Only the ends are enclosed and these are in buildings of steel frames covered with corrugated siding.

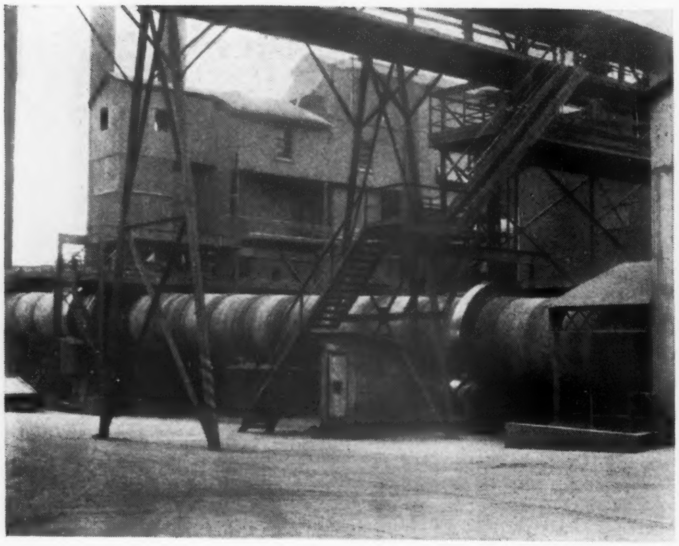
Arrangements are made for storing "Hy-test" cement in the silos which were described in the story on the packing plant published in Rock Products, September 4, 1926.

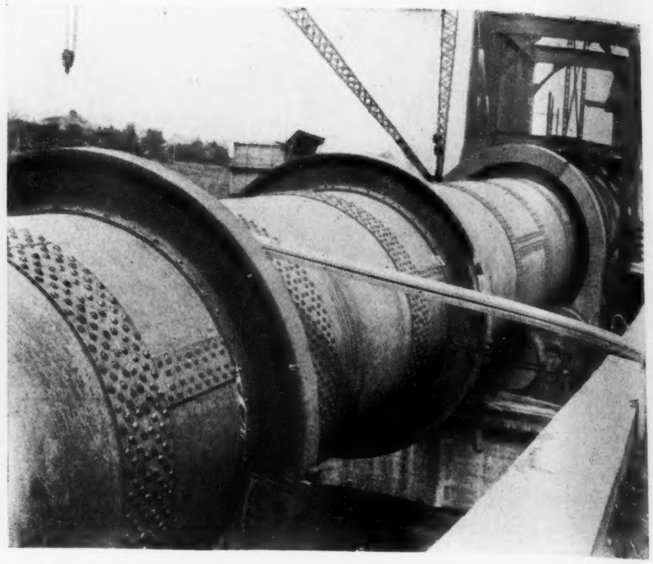
Natural cement production has had its ups and downs since the manufacture of portland cement began to grow in the United States, but it was too good a building material for its use to lapse entirely. Engineers who have tried to tear down structures put up with it can testify to its increased strength after a period of years,



Arches at the base of kilns through which clinker is drawn

New storage tanks for natural cement under construction





New rotary kiln, 180x9 ft., recently installed to make natural cement

and while it cannot hope to rival portland cement for concrete, for the purposes to which it is adapted, its use may increase.

Portland Cement Kilns

There are 12 kilns, eight 110 ft. long, three 150 ft. long and one 180 ft. long.

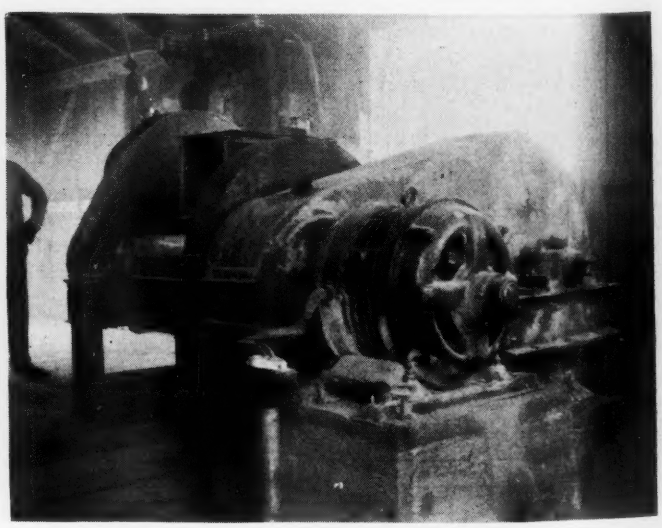
Rotary kiln showing one of the ends enclosed in steel frame building

The clinker after cooling is taken to the finish grinding department by a manganese steel chain conveyor made by the Bethlehem Foundry and Machine Co. Gypsum is added by a simple and effective feeder designed and built by the company. It is an adaptation of the "cross" feeder which delivers a definite amount at each quarter of a revolution and the number of revolutions is regulated by the amount of clinker coming in on the conveyor. In this way an unvarying percentage of gypsum is added to the clinker.

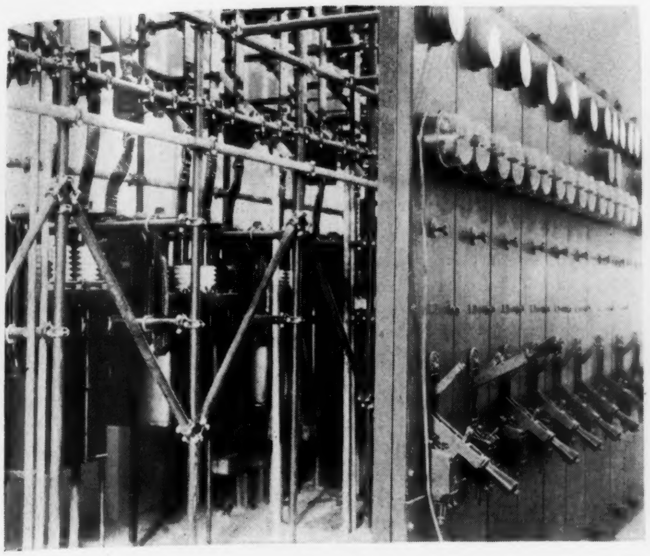
Grinding Practice

Both raw and finish grinding is done by Bradley Hercules mills for preliminary and No. 16 Smidth tube mills; and the grinding practice has been quite recently improved by the use of dust collectors and new motor drives.

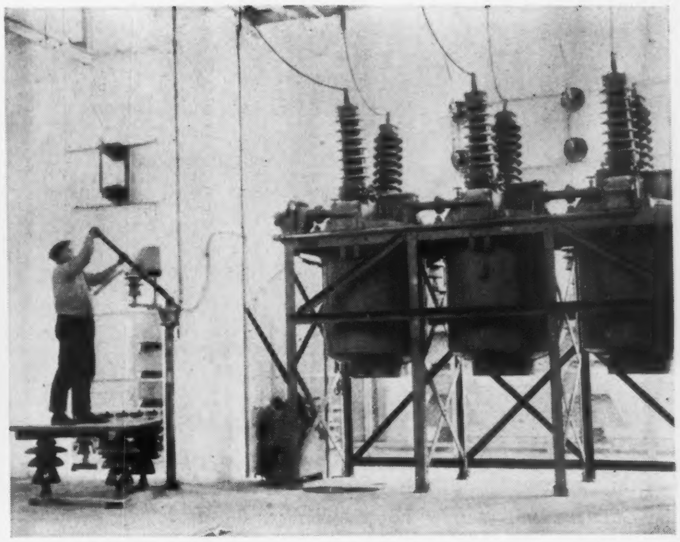
The Paxton dust collectors on the raw grinding mills are fed from a long pipe above the mills, this pipe being connected to shorter pipes which lead from sheet metal



Manganese steel conveyor carrying cooled clinker to finish grinding mills. It is driven by the electric motor shown at the right



Section of the power plant showing transformers, switchboard and recording instruments



High voltage current switches are so placed that operator must stand on insulated platform to reach them

hoods placed over the discharge end of the mills. An aspirating current made by connecting the suction of a fan to the long pipe thus draws all the dust that arises from the discharge of the mills and delivers it to the dust collectors. The discharge of the collectors is added to the discharge of the mills.

Each tube mill is driven by a Westinghouse 200-hp. synchronous motor with built-in magnetic clutch. In starting, the clutch is thrown out so that only the rotor of the motor turns. After it is up to speed as shown on the ammeter at the switchboard the clutch is energized slowly, both the ammeter for the motor and the clutch being watched to see that the load is applied slowly. It takes a little over a minute to bring the mill up to full speed.

This drive is very well liked and it was not adopted until it was thoroughly tried out in the plant.

Power Plant

A new reinforced concrete building holds the transformers, switches and recording instruments by which the electric current (purchased) is brought into the plant and distributed to the various departments. The building has a large room in which the transformers and the big switches for the high tension current are placed. On the other side of a partition are the switchboards and the recording instruments, which, like all the electrical equipment in the plant, are of Westinghouse make.

They are in unusually large number and from the records of these alone one could obtain a fair knowledge of what the plant was doing in the different departments. Below these rooms is a large and well-lighted basement in which a repair shop is to be installed, although when the plant was visited it was almost filled with motors, 380 of them, a part of those which were being substituted for the 25-cycle motors in use as fast as the change could be made without interfering with production.

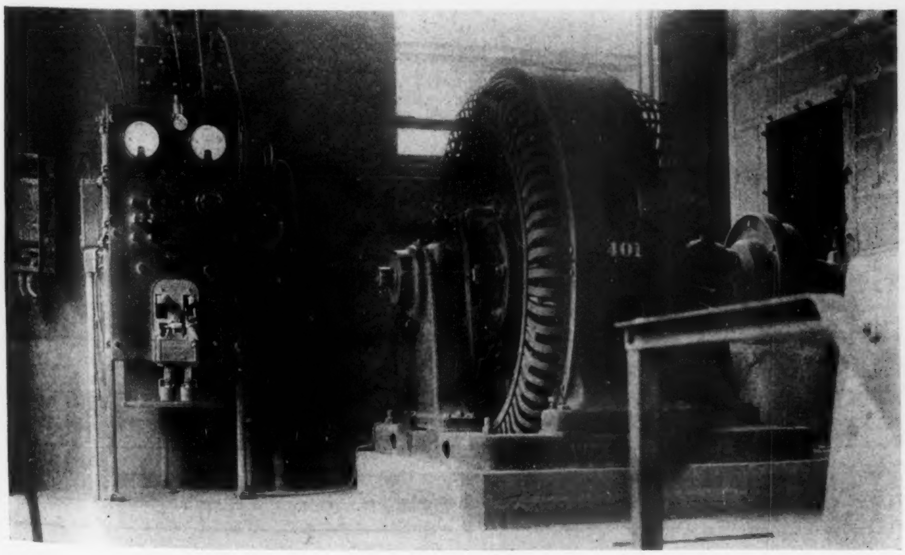
The building was put up by the Burrell Engineering and Construction Co., but all the work of installing the machinery in this station and changing over motors was done by E. G. Fluck, chief electrician, and his assistants, a somewhat remarkable record when one considers that the electrical machinery of the plant had all to be kept in operation while the changes were going on.

Part of the coal grinding plant

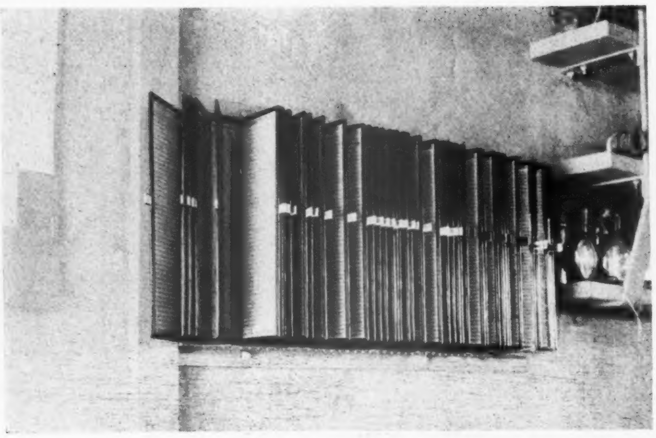
It is needless to say that the best practice has been followed to have everything as safe as possible for the operators in this station and plant. An example is shown by the picture of a man throwing in a high-voltage current switch. Note that the handle is placed so far above the floor that it cannot be reached except by standing on a stool, that the handle is of wood and that the stool is thoroughly insulated.

Warehouse and Storage

The supply house of a big portland cement manufacturing company must keep on hand so large a stock of repairs and replacements that it compares favorably with the stock of



One of the 300-hp. electric motors with built-in magnetic clutch driving the mills



Card index in which stock list is kept

the ordinary mill supply house. To purchase, store and disburse such a stock is really a business in itself, for a constant watch has to be maintained to see that a part is on hand when it is needed and, at the same time, that money is not tied up in items which may rust in the warehouse for years, perhaps until they go out of use altogether. To handle such a big business, a thorough system is necessary. This system must first of all permit anything that is wanted to be found instantly; in the second place it must show the amount on hand of each item and automatically warn the proper person if the stock gets low, and in the third place it must be simple and easily understood and provided with sufficient checks to catch any error in recording or figuring. All these things are provided in the system in use at the Lawrence plant.

The location of anything in the warehouse is known by the floor it is on, the section of the floor and if it is a small part by the rack and bin in which it is placed. Each of these is given a distinguishing number or letter, and the place where an item is to be found is entered in the stock list by these. Thus A-15-8-3 would mean that an article is to be found on the first floor, 15th section, the eighth rack and the third compartment. The stock list is kept in a "Kardex" file which is fastened to the wall at the place where an attendant receiving a requisition can consult it easily.

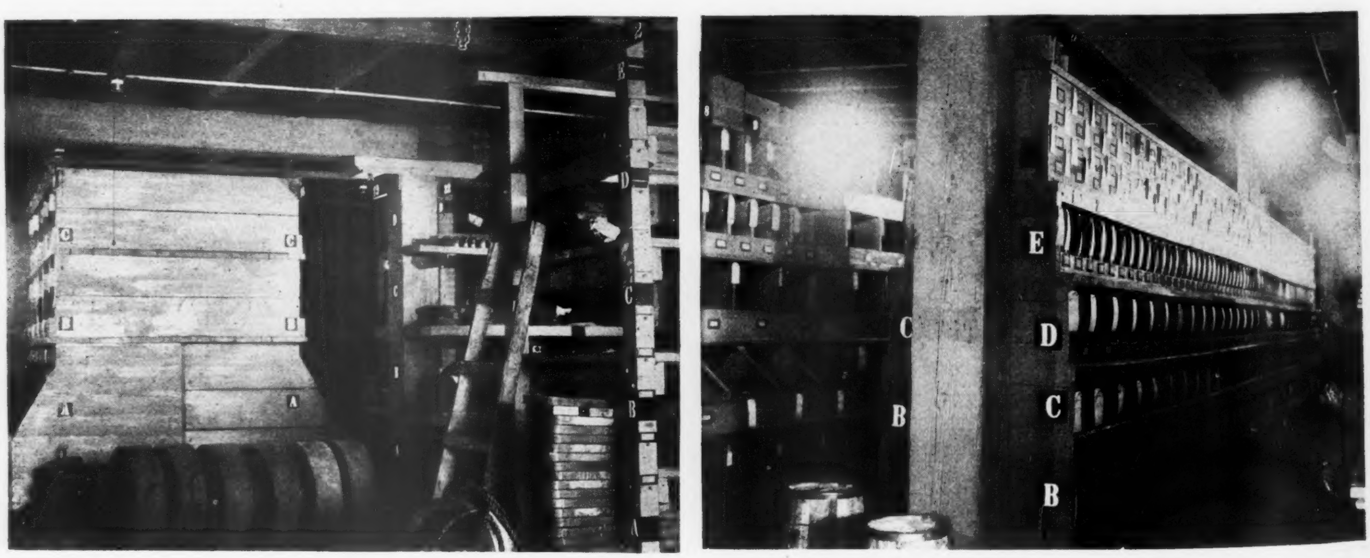
Each bin has a small hook on which a tag is hung each time a requisition is filled from it. The reproduction of one of these tags shows that it is a perpetual inventory as well as a record of who ordered the part and why, the date, and other necessary information. Tags are made out in duplicate, the duplicate tag being hung on a board near the warehouse office where it can be consulted easily. An inventory of the entire warehouse might be made at any time from this board and, in addition, there is provided a quick reference to show check matters as how many of an item have been issued for a particular job.

Duplicate tags hung on board near warehouse office

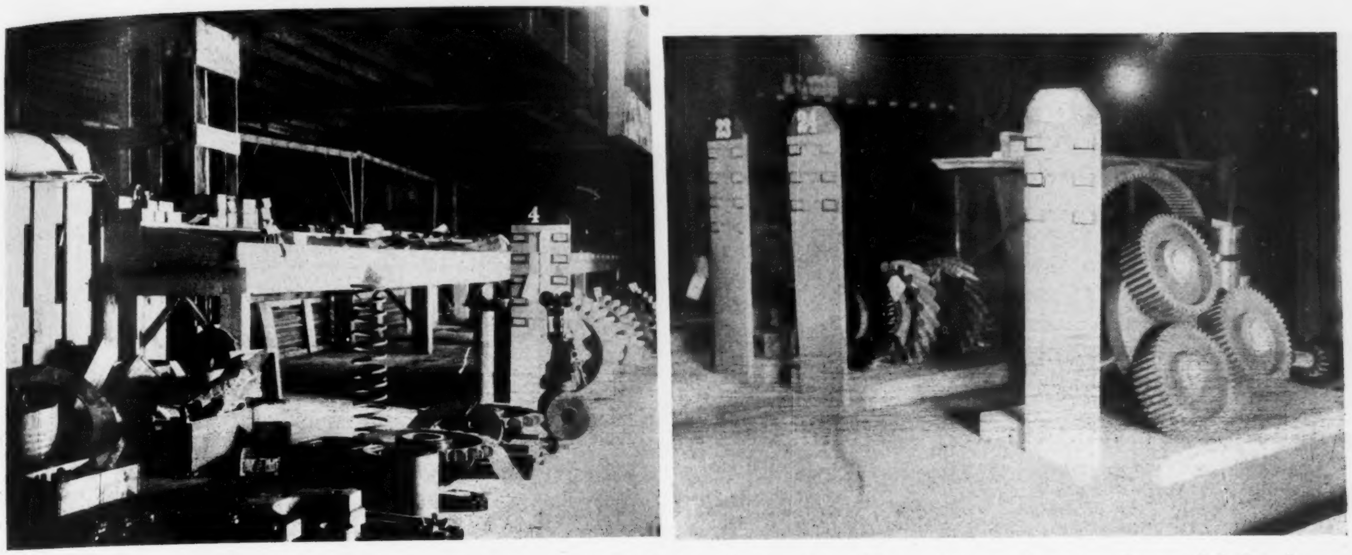
There is a bin label, also reproduced here, beside the tag on each bin, and also in duplicate on the board on which the duplicate tags are hung. This bin label keeps track of orders, showing where the part is to be ordered from, how many should be ordered and the time required for delivery.

Simple arrangements have been made to provide a warning that a part is getting low. If it is kept in a bin, as bolts and nuts are kept, a piece of tin placed over a few layers at the bottom serves as a warning. For small parts, the minimum quantity that may be kept on hand is done up in a shot bag. Large parts, of which only one or two are kept on hand, show by their presence or absence whether enough are on hand or not. When the stock of a part is so low that ordering is advisable a blue tag is made out when a requisition is filled and this blue card is duplicated on the board. As soon as a blue card appears the head of the department concerned is notified and puts an order through to the purchasing agent.

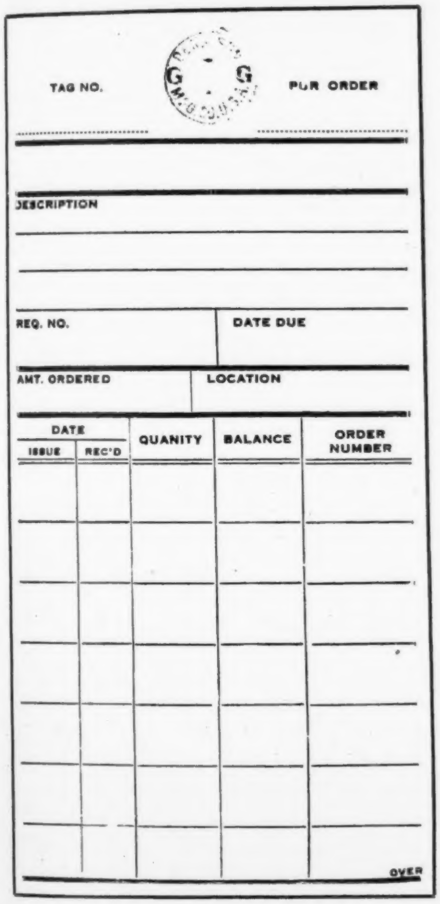
All issues are made on requisition, and the requisition carries practically all the information on the tag. It also carries the unit cost of each part and an extension showing the cost of all the parts ordered. This information goes to the auditor's office and is entered in his records. From these records the information is available to check the warehouse records made from the tags. This is only one of three methods by which



Section of warehouse showing system of distinguishing letters and numbers which permits desired articles to be easily found



Parts not placed in bins are put on platforms. An upright board placed at this section carries a number and is fitted with hooks and frames for cards and labels



TAG NO. PUR ORDER

DESCRIPTION

REQ. NO. DATE DUE

AMT. ORDERED LOCATION

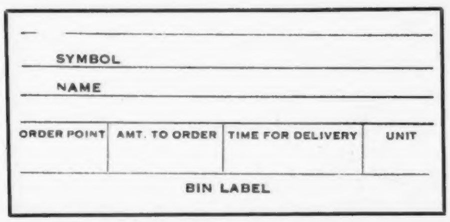
DATE		QUANITY	BALANCE	ORDER NUMBER
ISSUE	REC'D			

OVER

Bin tag which is filled out in duplicate each time material is given out from stock. One of these is put on a hook at the bin and the other on a board near the office

warehouse records are checked so that any error in entering an item or in figuring an extension will show up in the same way that an error shows in a bookkeeper's trial balance. The auditor in addition to the requisitions gets a daily warehouse report and also gets the cards showing "out" for checking.

The warehouse is well lighted in every part and kept as neat as a good housewife's parlor, which must be a considerable job, near a dusty cement plant. Only the very heaviest pieces and such things as heavy reels of cable and coils of rope are kept on the floor. Other parts that do not go in bins are placed on benches or platforms. Each of these platforms carries an upright board on which the section number is painted and which has hooks and frames for cards and bin labels. Warning that the stock is getting low on some of these is given by painting the last three pieces red. Very large parts or large spare equipment, which cannot be easily put in the warehouse, are kept in a yard outside.



SYMBOL

NAME

ORDER POINT	AMT. TO ORDER	TIME FOR DELIVERY	UNIT

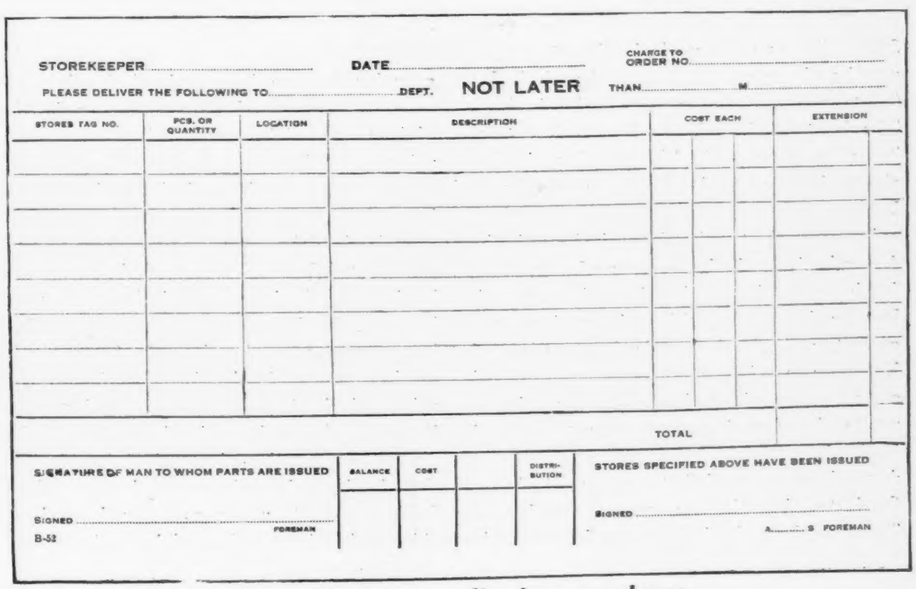
BIN LABEL

Bin label which is used to keep track of orders. This is placed on the bin beside the bin tag

No one is allowed in the warehouse but those who are regularly employed there. A counter at which men present requisitions closes the entrance, but it is arranged to swing aside whenever heavy pieces are brought in or out. M. D. Hosier is the storekeeper in charge.

The system was suggested by W. P. Keichel, the foreman of the machine shop, and it has worked out very well in practice. It would be hard to see how it might be bettered in the way of keeping a full set of records, always up to date and without much red tape and paper work.

The officers of the Lawrence Portland Cement Co. are: President, Frank H. Smith; vice-president, Ernest R. Ackerman; second vice-president, Marion S. Ackerman; third vice-president and superintend-



STOREKEEPER .... DATE .... CHARGE TO ORDER NO. ....

PLEASE DELIVER THE FOLLOWING TO .... DEPT. NOT LATER THAN .... M.

STORES TAG NO.	PCS. OR QUANTITY	LOCATION	DESCRIPTION	COST EACH	EXTENSION
				TOTAL	

SIGNATURE OF MAN TO WHOM PARTS ARE ISSUED	BALANCE	COST		DISTRIBUTION	STORES SPECIFIED ABOVE HAVE BEEN ISSUED
SIGNED .... FOREMAN					SIGNED .... A........ S FOREMAN

B-52

Requisition blank for supplies from warehouse

ent, Charles A. Porter; secretary, James S. Van Middlesworth; treasurer, Edgar E. Shepard; assistant treasurer, C. M. Loeser; chemist, Lewis A. Eisenhard; purchasing agent, J. H. Van Middlesworth.

The Burrell Engineering and Construction Co., Chicago, were engineers and contractors for improvements and construction of the new stock and pack houses, stone bins, coal bins, yard improvements, transformer house, and miscellaneous changes.

Warehouse and storage building at Lawrence Portland Cement Co. Spare parts not easily kept within are placed in the yard as shown

The main office of the company is at the plant at Siegfried (postoffice address, Northampton, Penn.). The sales agent is the Lawrence Cement Co., 302 Broadway, New York, N. Y., Harrison Bldg., Philadelphia, Penn., 31 Milk St., Boston, Mass.

German Cement Industry in 1926

SHIPMENTS of cement in Germany amounted to about 5,650,000 tons in 1926 as compared with 5,807,000 tons in 1925, a decline of about 5%. This was considerably below that marketed in the last pre-war year, 1914, when 7,000,000 tons were shipped. The unstable political conditions in the country and delayed building programs were the chief causes of the decreased production. The first nine months of 1926 were not quite so bad but along about October, the demand for cement increased until at the end of the year, total shipments for the year were almost up to that of the previous year. Some idea of how different the conditions in 1926 were from those in 1925 may be gained from the following: In 1925, the greater part of the shipments, 3,620,000 tons were made in the first seven months of the year as compared with 3,225,000 tons shipped in the same period in 1926. The 1926 October, November, and December sales were 10%, 15 to 20% and 75% above those made in the same months in 1925.

In contrast to the irregularity of the domestic demand, the exports of cement to foreign countries continued steadily upward. Despite keen competition from American cement and the price cutting tactics of European producers, German exports of cement were about 1,000,000 tons, almost up to the record cement export year of 1913. The British coal strike which cut down the exports of that country, was beneficial to the German cement producers. Towards the end of the year, the economic situations in several importing countries were so relieved that fiscal tariffs on cement were no longer a necessity and this helped increase German exports.

Cement prices declined somewhat in April but from that time to the end of the year remained firm. The average price was about 125% above pre-war. According to reports, there will be no increase in the early months of 1927, regardless of increased fuel costs and the increased manufacturing cost necessary to produce cement to meet the new and higher strength standards adopted.

The year 1926 brought about a greater rationalization of the German cement industry through the almost complete merging of local interests in the three large Unions—the Northern, Western and Southern German Cement Union (Zementverband), the merger of the cement companies in Silesia and the reorganization of the Dusseldorf Slag Cement Association along the lines of a cartel system. The latter represents one of the strictest forms of a cartel system considering German economic conditions and comes nearest to a trust organization. This extensive consolidation has permitted a closer adaption of production to demand within the past year. A number of out of date and inefficient plants were shut down and their employes and output divided among other operating plants. The financial situation was so improved within the past year that many of the companies in the Unions were able to modernize their plants, using part of the surplus capital. Improvements were not only made in machinery but in many instances plants were completely electrified. The significance of this with respect to the entire cement industry can be best realized by considering a specific instance, the Wicking Company who, after improvements, produced in the last year as much cement as in the three previous years, using only half as much power as formerly. By economies such as the foregoing the industry has met the advanced fuel costs and though the price of cement has remained fairly constant, many concerns have been able to build up substantial surpluses and pay extra dividends.

The present year, 1927, seems to hold good potential demand for cement. The national housing program is slightly less than last year but the early advent of private construction is expected and this will undoubtedly increase the building schedule. Municipal construction work is a little above that of last year. Road and street building is expected to increase considerably over the past few years and this offers perhaps the greatest potential market for cement in all Germany.—*Tonindustrie-Zeitung.*

Proposed Change in Method of Testing Cement

COMMITTEE C-1 ON CEMENT, of the American Society for Testing Materials, at its meeting at the Bureau of Standards in January, discussed the question of using a fluid neat cement paste as an acceptance test in the purchase of portland cement. In the light of a preliminary investigation which indicated that further work should be done, the committee decided to carry out a very extensive program in which over 30 cements will be selected from warehouses all over the country. These cements will be mixed and divided into samples which are to be tested by 52 co-operating laboratories. Nine of these laboratories will receive larger samples from which concrete will also be made. The purpose of the entire investigation is to determine whether such fluid mixtures can be used as an acceptance test in lieu of the present test outlined in the society's standard cement specifications; to determine if such a test cannot be performed more readily, with the obtaining of more concordant results, and also to determine whether there is a fixed relation between values obtained with such a paste and the values obtained from the cement when tested as concrete.

Safety in Tamping

LOOSE fragments of rock falling in a borehole while explosive charges are being loaded are a source of danger, warns the Bureau of Mines, Department of Commerce. Besides the danger due to the impact of the falling rock on the charge, there is the possibility that in tamping the charges the rubbing of broken cartridges or small particles of explosive between two pieces of loose rock, or between a loose fragment and the side of the borehole, may cause a premature explosion. In addition, the frictional impact of the tamping bar against a thin layer of explosive adhering to the side of the borehole might also cause premature explosion.

In cherty or highly siliceous ground, the rubbing of loose particles of rock against each other or along the side of a borehole may cause sparks. Under such conditions care should be taken not to use quick motions or heavy pressure in tamping the charges, particularly if the explosive used is susceptible to explosion by sparks.

A Simple, Practical Sand Operation

Acme Sand Company, Eustis, Florida, Has a Simple Pumping Plant That Was Once on the Lake Bottom for Three Weeks

By Herbert C. McKay
Eustis, Florida

THE Acme Sand Co., of Eustis, Fla., is neither the oldest nor the largest sand plant in the state, but it is decidedly one of the first in simplicity of operation, and the sand which it puts out is of excellent quality. So great is the demand for this sand for use in the building trades that no grading is attempted. The sand is sold for but one purpose, and for that purpose it is said to be one of the best grades in the United States.

Four years ago the plant was started with one small dredge, a 6-in. pump boat and a simple wooden sand-dewatering cone. At this time the lift was only about 15 ft., and the pipe line had a length of perhaps 50 ft. The pump was belt-driven by a single cylinder gasoline engine of 25 hp.

At the present time the plant consists of a wooden dredge equipped with a 2-cylinder, 80-hp. Fairbanks-Morse heavy duty Diesel engine, driving an 8-in. Tampa pump. With the soft bottom, no cutting head is necessary. The dredge is held in place with anchors instead of spuds, and is provided with a power-driven winch for moving from position to position.

The pipe line has a length of 1100 ft., the suction lift averages about 20 ft. from the bottom of the lake, and 4 ft. from the surface. On shore the line is divided by a valve system. One line leads to the "beach." This "beach" is entirely artificial, having been built up at odd moments. Here sand

Desirable Simplicity

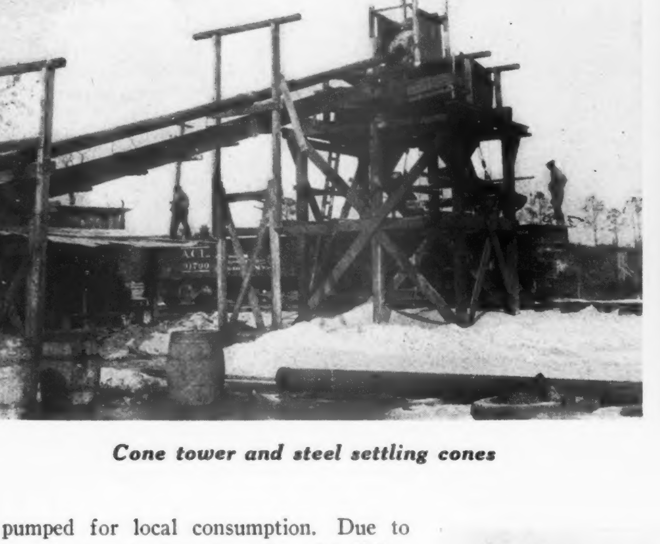
IT may sometimes appear to the operators of small and simply-constructed plants that our columns are devoted largely to big and complicated operations, as though their mere size and difficulties gave them special merit.

We editors are human, and it is easier to find matters of general interest to the industry in large operations than in small ones; and the operations with the most difficulties and numerous problems usually furnish the most material for "stories."

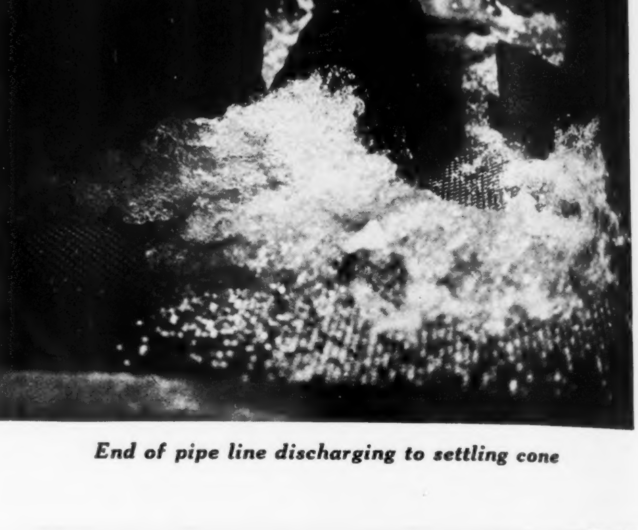
But there is no special merit in size and complicated processing, if conditions and market do not require them. In a struggle for lower costs by increasing the volume of production, we often overlook the fact that there is an equal opportunity for lowering costs in simplifying operations and the elimination of machinery and processes, that may be eliminated by a study of special cases.

In an operation such as described, where the natural product is clean and well graded, and the whole operation subjected to the vagaries of sub-tropical storms, the simpler the plant the greater the wisdom and good business judgment of its builders—is the obvious conclusion.—The Editors.

Acme Sand Co.'s operation at Eustis, Fla., showing the Diesel driven dredge, pipe-line and return sluice



Cone tower and steel settling cones



End of pipe line discharging to settling cone

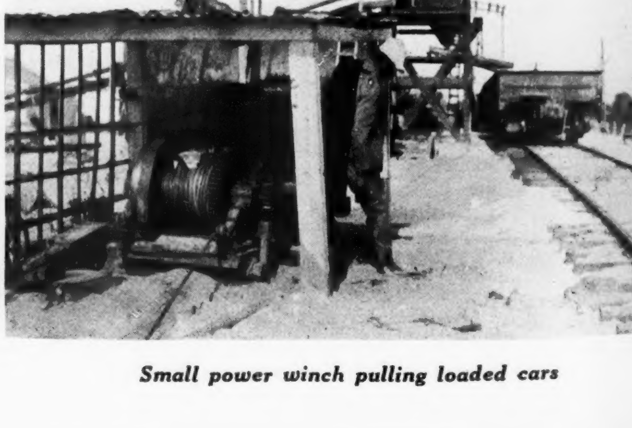
is pumped for local consumption. Due to the great amount of road work and building in the immediate neighborhood, this local consumption has amounted to some thousand or so tons per week.

The other division of the pipe line rises abruptly to a height of 25 ft., where it discharges into two large steel sand settling or dewatering cones. The surplus water flows back into the lake through a conduit, and sand which is barely wet enough to flow is fed into the railway cars. At the present time the capacity of the plant is 100 tons per hour.

This plant has had unfortunate experience, for one of the severe midsummer storms capsized and sunk the dredge in about 25 ft. of water. All of the superstructure was torn away, and all machinery torn loose from the hull with the exception of the engine and pump. Due to the difficulty encountered in securing the services of a diver, the dredge remained in this condition for ten days. It is interesting to note that at last the plant engineer, Charles W. McKay, without any previous experience in diving, donned a suit which was finally secured,

Looking down on the plant from the cone tower

Loading cars from the settling cones



Small power winch pulling loaded cars

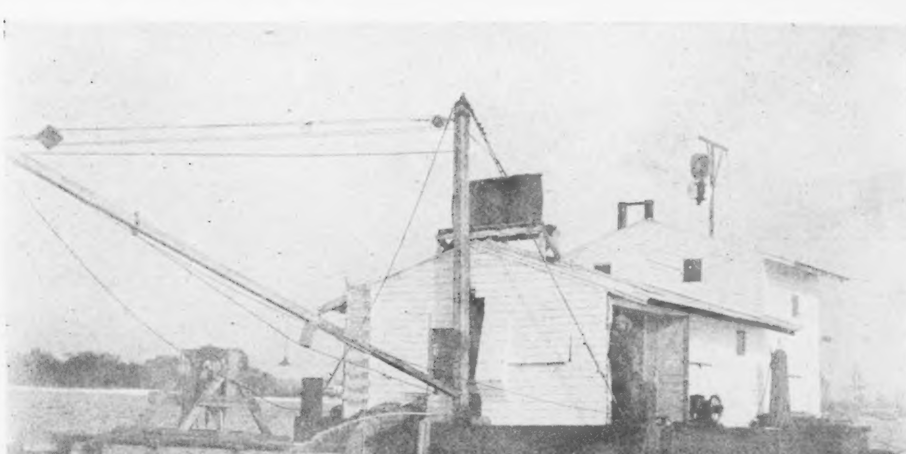
and salvaged hundreds of dollars' worth of small tools and machinery.

When the bottom was fairly clean, a ⅞-in. steel hawser was secured to the dredge hull and passed to shore, a distance of about 1000 ft. The Fordson power winch which was used for pulling loaded cars was moved to the lake shore and firmly anchored. Then the pull was started. The pump gave way and operations were stopped on the hull until the pump was salvaged. This occupied two days. Finally the hauling up of the hull was started again, and after great difficulty it was beached. The engine was overhauled, and two broken exhaust elbows, one injector and other minor parts were replaced. The hull was repaired and floated, and at the present time the Acme Sand Co. is operating with the engine, hull and pump which were submerged for a period of a little more than three weeks. It may be remarked that this engine, rated at 80-hp., is operating under a constant 40% overload.

At the time this is being written a new steel dredge hull is completed and ready for launching. This dredge will be equipped with a 200-hp. Fairbanks-Morse a.c. electric motor. It is expected that this equipment will enable the pipe line length to be increased to a maximum of 2000 ft.

The sand supplied by this company shows a constant high analysis in repeated tests. Following is a copy of a report made by the Pittsburgh Testing Laboratory, August 5, 1926, under laboratory number 7122:

		Pct.
Passing 4-mesh	Return on 10-mesh,	0.7
Passing 10-mesh	Return on 20-mesh,	15.0
Passing 20-mesh	Return on 30-mesh,	33.3
Passing 30-mesh	Return on 40-mesh,	21.0
Passing 40-mesh	Return on 50-mesh,	18.3
Passing 50-mesh	Return on 80-mesh,	8.3
Passing 80-mesh	Return on 100-mesh,	1.7
Passing 100-mesh	Return on 200-mesh,	0.7
Passing 200-mesh		0.0
		99.0



Diesel driven dredge equipped with 8-in. pump

Comparison with Ottawa Standard

1-3 mortar	—Tensile test—	7-day test period
Acme sand	1-435 2-490 3-425	Av. 450
Ottawa	1-385 2-380 3-360	Av. 375

Strength ratio 120%.

A. S. T. M. Committee Work on Concrete and Concrete Aggregates

COMMITTEE C-9 ON CONCRETE AND CONCRETE AGGREGATES, of the American Society for Testing Materials, at its meeting held at the Bellevue-Stratford hotel, Philadelphia, on March 17, received a number of interesting reports from its sub-committees. The sub-committee on design of concrete has made a thorough review of the principle theories of design now advanced and has carried out studies directed toward the development of an adequate theory on which to base design methods. Several years ago an extensive series of tests of concrete proportioning was carried out. The test data resulting from these tests are being studied at the University of Wisconsin, in which study the sub-committee on design is co-operating.

The sub-committee on specifications has suggested a revision of that portion of the report of the joint committee on concrete and reinforced concrete relating to the preparation, materials and testing of concrete. It is believed by the committee that the suggested requirements will be more genrally acceptable to the concrete industry.

Committee C-9 thus far has been responsible for the preparation of eight standards and tentative standards dealing with specifications for concrete and concrete aggregates and methods of test. Clarity and definiteness are highly important characteristics of technical specifications and all of the specifications have been critically reviewed during the past year and certain editorial changes have been made.

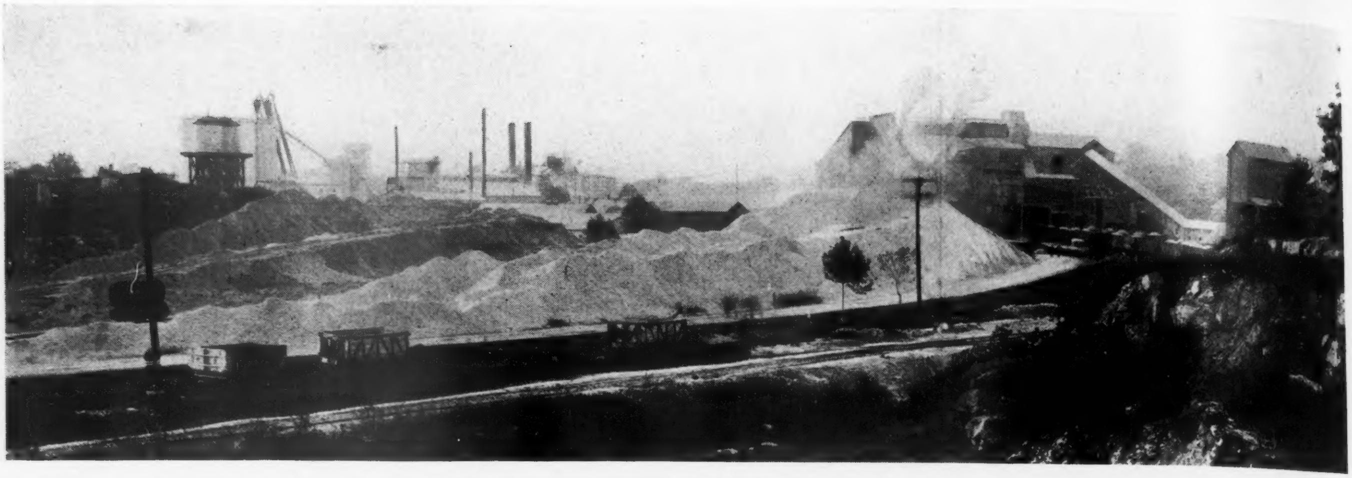
The committee is sponsoring a comprehensive symposium on field control of the quality of concrete, which will contain papers on the following:

- Proportioning of concrete.
- Mixing of concrete.
- Conveying and placing concrete.
- Field testing and its significance.
- Producing quality concrete in cold weather.
- Construction joints and expansion joints.
- Transverse tests as a criterion of the quality of concrete.

In addition the committee is securing papers on the design of concrete mixes and on the geological aspects of concrete aggregates.

The chairman of the committee on concrete and concrete aggregates is Floyd M. Chapman, consulting engineer, New York City. The secretary is Stanton Walker, director, engineering and research division, National Sand and Gravel Association, Washington, D. C.

Loading sand for local consumption from the "beach"



Storage piles of washed material at the Marble Cliff Quarries Co., Columbus, Ohio. The lime plant shows at the left and crushing plant in the background

Wasteless Limestone Quarry Operations

Marble Cliff Quarries Co., Columbus, Ohio, Markets Everything That Goes from the Quarries to Plants

THE Marble Cliff Quarries Co. of Columbus, Ohio, presents one of the outstanding examples of success in the quarry industry. It is not that its output is so large, although that may reach a million and a half tons yearly; it is rather the way that its success has been achieved in the face of competition from other materials such as might have forced a less progressive company to remain a producer for local consumption. It is surrounded on all sides with producers of gravel and slag, not to speak of other quarries, and it is in a locality where highway work is mostly completed and the principal highway demand is for repair materials. Yet in the face of such conditions it has gone on steadily year by year increasing its plant equipment, its production and its profits.

Editors' Note

THE objective in every well managed business is to have no waste production.

For years quarry screenings were waste They still are at many plants.

In this operation nothing is waste. Hence it is a model operation.

That justifies our continuing story of the Marble Cliff Quarries Co.'s operations.

The value of the story to other limestone operators is that all the product of the quarry has a value.

—The Editors.

Elimination of Waste

The explanation lies in three words—*elimination of waste*. Everything that goes from the quarry to the plants is manufactured into something for which there is a ready market. Nothing is marketed as a "by-product" at a low price, merely to keep from wasting it. Every product is a standard product which is readily marketable.

Such a result did not come in a short time or by any stroke of good fortune. It came from a constant and intensive study of market conditions and the possibilities and limitation of the stone in the quarry. An accumulation of quarry waste suggested a washing plant to work up this waste into concrete coarse aggregate. Further study along the same lines brought out the now famous "Marble Cliff limestone sand." Then the lessening of the market's demand for a certain size of stone started an investigation of the possibilities of burning this size to lime, and a lime plant followed. To maintain the market that was developed for this lime a mixed mortar plant was built. And to make certain that the highway materials furnished were laid on the road in the most durable fashion a new asphalt paving material was developed and a mixing plant was installed. All of these enterprises were successful not only because the need for the product had been determined before any one of them was started, but because the company took the time and spent the money that was necessary to investigate methods and equipment thoroughly before beginning to build.

Today the company has two very large quarries in operation, known as the North Quarry and the South Quarry. It operates two crushing and washing plants, Plant B and Plant X, and a smaller crushing plant for ballast, Plant F. These produce flux stone, ballast, washed and screened concrete coarse aggregate and fine aggregate, and macadam and bituminous road material. It burns lime in two rotary kilns each of which is fed 200 tons of stone daily per kiln. It grinds its fines into agricultural limestone and fillers in a new and very modern plant, and recent additions are the mixed mortar plant and asphalt plant referred to above. Its property is about three miles long and a mile wide and holds ample reserves for future operations.

Quarrying a Double Ledge

The quarry is in the Columbus and Delaware limestone, which is the lowest formation of the Devonian in Ohio. The quarry working is quite unusual in that two separate and distinct ledges are worked and each has to be kept separated from the other. Fortunately, the two ledges part very distinctly and cleanly. The upper ledge, called "top rock," is a hard siliceous limestone and varies in thickness from 17 ft. to 32 ft. It is the source of road material and aggregate and is considerably better than what is required for "Grade A" stone in Ohio. The lower ledge averages 44 ft. in thickness and, while of "A" grade quality, is somewhat softer than the "top rock"; it is a fairly high calcium limestone. It contains a little magnesia, but very little silica, so that it is excellent for flux, for burning to lime and for making agricultural limestone.

Each ledge is quarried as a separate bench. Well drill holes are put down with Sanderson Cyclone and Loomis Clipper drills and loaded only in the bottom 12 or 13 ft.

Ingersoll-Rand Jackhamers and Denver tripod drills are used in block holing. The rock is loaded on the cars by Marion steam shovels, some of which have been placed on caterpillar treads.

After the top rock has been removed the top of the ledge below is carefully cleaned up to make sure that none of the top rock becomes mixed with the fluxstone.

Since the two kinds of rock have to be kept separate, two plants for crushing and washing have to be maintained. Plant B (Plant A was long ago dismantled) is fed with top rock which is brought in by steam locomotives of Lima, Porter, American, and Vulcan manufacture, of which in all 18 are in use. The track and cars are standard gage.

The primary crusher in Plant B is a No. 21 Allis-Chalmers Gates type and it is followed by three No. 8 crushers of the same make. For fine crushing there has recently been installed a Symons cone type crusher. The plant output is of 4-in., 2½-in., 1½-in., ¾-in. and ½-in. crushed stone and "limestone sand." The 2½-in. and smaller sizes of crushed stone are washed; the screenings from the secondary crushers, however, are not washed, as they are used in macadam road construction and are preferred in the unwashed state.

New pulverizing Plant X of the Marble Cliff Quarries Co., Columbus, Ohio

Washing Crushed Stone

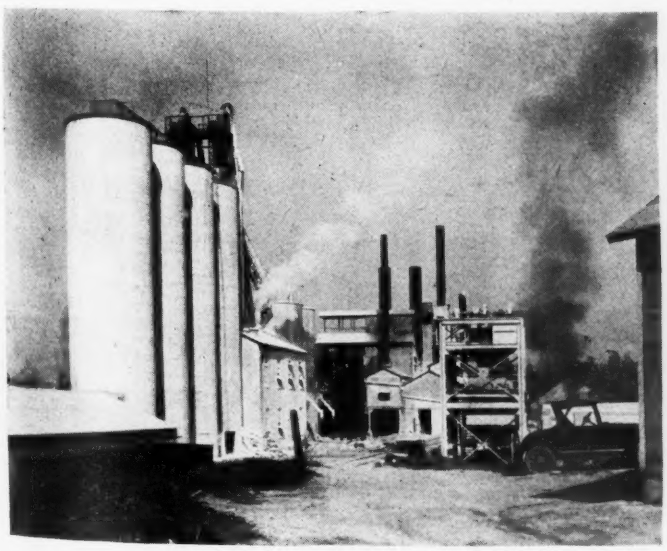
The washing plant consists of a scrubber or washing cylinder, with lifters to turn the stone, which is 20 ft. long and 9 ft. in diameter. The stone from this goes to two lines of Dull (Link-Belt) screens and the undersize of the sand screen, the last in the series, goes to three sand boxes, a large one which gives a preliminary wash and two of smaller size for making concrete sand and masons' or plastering sand. The 20x9-ft. scrubbing cylinder and the sand boxes were designed and built at the plant. The sand boxes are simply long boxes on an incline in which a drag conveyor moves to pull out the settled sand, and the important feature in which they vary from some other sand boxes of this type is that the slack side of the drag conveyor does the digging. Before this way of driving the drag conveyor was adopted trouble was had with sand settling around the drags so firmly that they could not be moved without breaking the chain.

The practice of washing stone has been already described in some detail by ROCK PRODUCTS in the issues of December 31, 1921, and March 22, 1924.

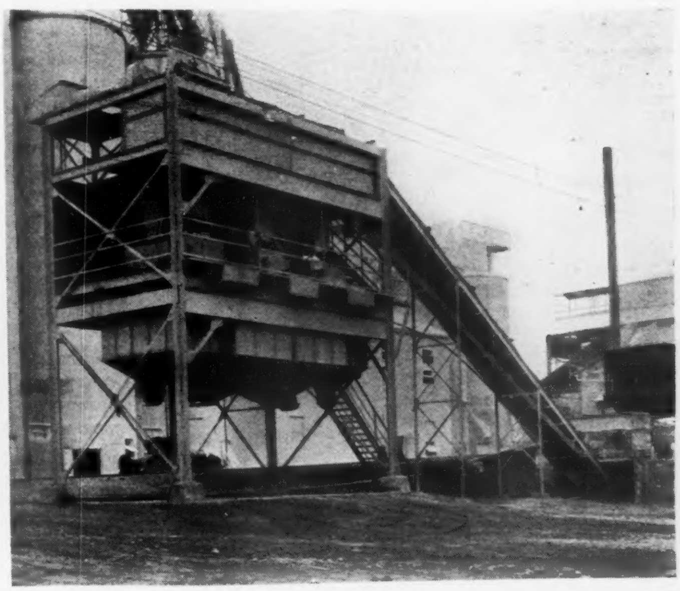
Plant X is as nearly a duplicate of Plant B as the character of the products will permit. It has a No. 21 primary crusher and two No. 7½ secondary crushers — fewer and smaller crushers, because a considerable part of the plant's production is in larger sizes. The sizes made are 8-in., 6-in., 4-in., 2½-in., 1½-in., ¾-in., ½-in., ¼-in. grit and "sand." The larger sizes are sold as flux and as kiln stone for chemical industries that burn their own lime. The ½-in. stone is fed to the lime kilns by an aerial tramway made by the Interstate Equipment Co. The ¼-in. grit is removed from the kiln feed so as to have as uniform a product as possible for burning. It furnishes most of the feed for the newly installed pulverizing plant in which agricultural limestone is made.

All the sizes below (and including) 2½-in. are washed, and the washing plant is a duplicate of that which was described as a part of Plant B.

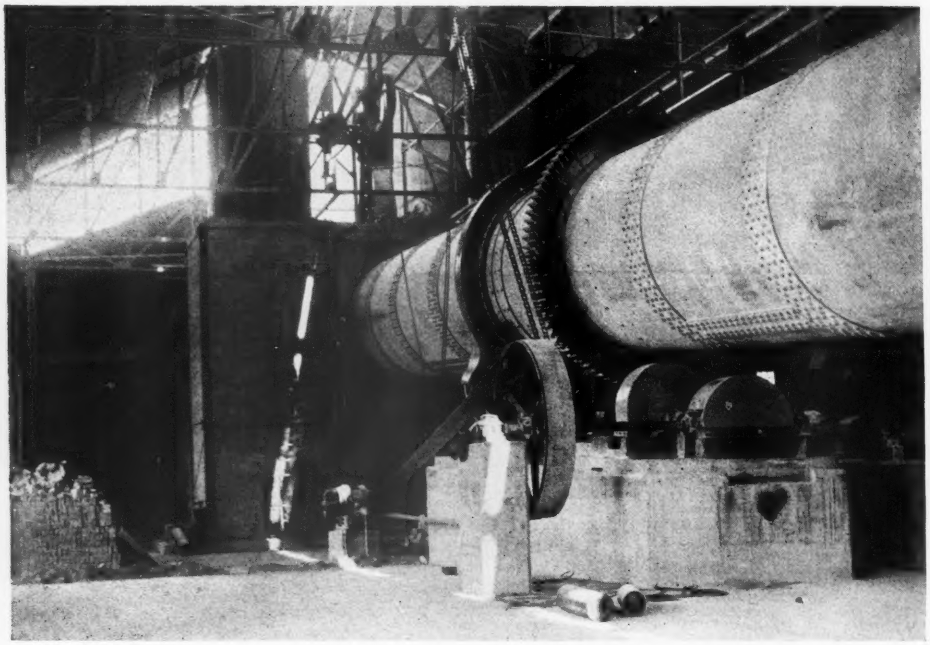
The rock for plant X is brought in from the quarry by the Woodford centrally con-



Enlarged rotary kiln plant and silos of Marble Cliff Quarries Co. The mixed lime mortar plant in the right background is shown in the accompanying view



Mixed mortar plant which uses washed limestone screenings for sand



Second rotary kiln for burning lime recently installed. Construction details and dimensions are the same as for the first kiln

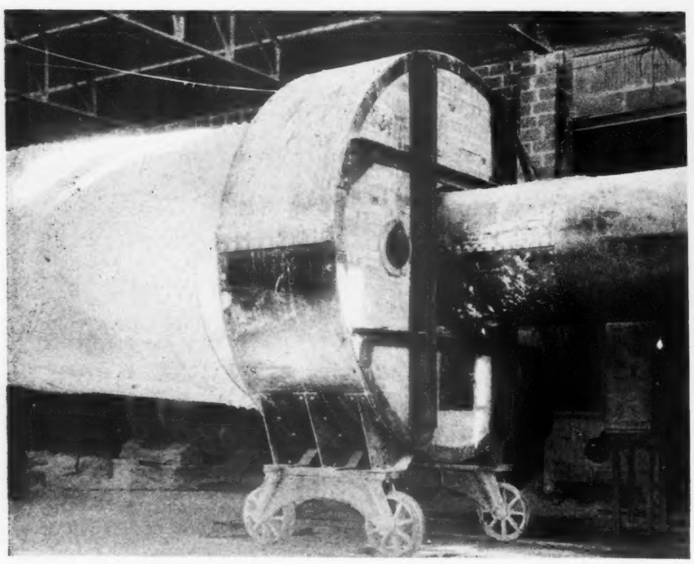
trolled electric haulage system, which uses cars with individual motors taking current from a third rail. It is one of the most notable installations of this system and it was the subject of a special article in Rock Products for August 23, 1924.

Lime Burning

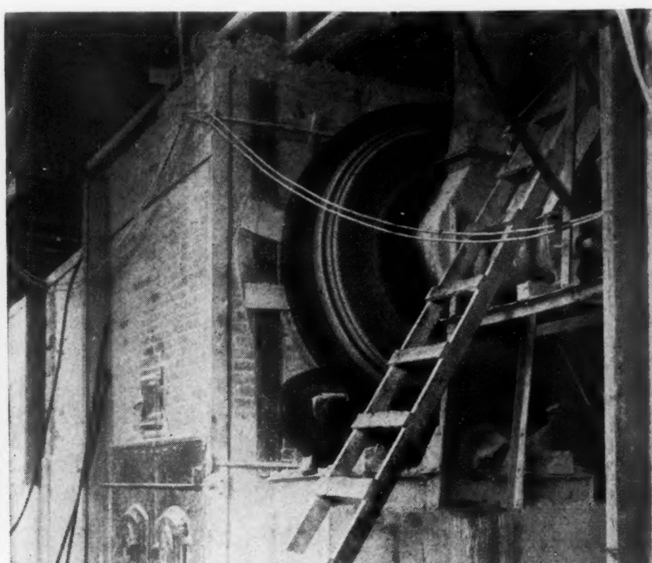
Lime burning was begun in the latter part of November, 1923, at which time the plant was visited and later described in detail in Rock Products (issue of March 22, 1924). Lime had been burned at Marble Cliff in years before. The father of the present general superintendent, Harry Welch, and the quarry superintendent, James Welch, burned lime from this rock in Civil War times, and later the Stitt-Price Co. was one of the largest lime producers in the district, burning Marble Cliff rock. Nevertheless there was a legend to the effect that Marble Cliff lime was "too hot" and that it would "set like cement." One may surmise that some of the siliceous stone was burned in the earlier kilns and that a hydraulic lime, or a mixture of hydraulic lime and quicklime, resulted. So before going into the lime business the company did some experimenting and even sent away carloads of stone to be burned. These proved that Marble Cliff stone made a very good lime indeed, and its success in the market, in the face of strong competition, which has called for the erection of a second kiln, is ample evidence of this.

Nevertheless, when it came to actual burning of the stone in rotary kilns, a problem was presented which was only solved by considerable study and experimentation. It was found that the position of the burner was important, and that what was of the most importance was a pretty exact regulation of the temperature. Pyrometers were installed and it was found that the hot end of the kiln must be kept at 1600 deg. C. and the "cold" end at 1200 deg. in order to make good lime. The current production is watched very carefully to see that a uniform quality is maintained. Samples are taken every 10 minutes and submitted to a slaking test under rigidly controlled conditions, and the core remaining is dried, weighed and recorded.

Coal for the Wood gas producers used has been the subject of much study. The makers of the producers recommended a single kind of coal which gave satisfactory results. But it seemed good business to investigate all the coals which might be bought within a reasonable distance, and this was done. It was found that no less than eight different mines, widely separated, could furnish coal that was entirely satisfactory for producer use. The lime plant was designed by the Schaffer Engineering Co. and the first kiln installed was made by the Worthington Pump and Machinery Co. It was so satisfactory that when a second kiln was installed the dimensions and construction details were duplicated, but it was made by the Vulcan Iron Works, because this company could give an earlier delivery. It was shipped to the plant, riveted up, on five flat cars, and care had to be taken to see that it was shipped with the right end foremost, as it would have been impossible to have turned it around after it reached the plant without cutting it in pieces. Ordering it riveted up insured that it would be perfectly in line, as it was found to be when it was placed on its foundations.



Discharge and firing end of the rotary kiln, with gas inlet—Rotary kilns were installed to utilize a small size stone for which there was no demand



Dryer in pulverizing plant which uses waste heat from lime kilns

Most of the lime is sold as hydrate and the hydrating plant comprises a Schaffer hydrator, Raymond mills with air separating system, a bag filler for catching the finest dust, and large concrete silos for storage. The feed to the hydrator is controlled by a Schaffer poidometer.

There was the usual loss of heat in the stack gases from the rotary kiln until a way was found to utilize this heat, at least in part. It has quite recently been put to work to dry stone which is to be ground for agricultural limestone and mineral filler.

Pulverized Limestone Plant

The Christie dryer in which this waste heat is utilized is a cylinder 50 ft. long and 5 ft. in diameter. The ends are closed except for a joint where the pipe from the kiln chamber enters. A vertical pipe from a hopper above joins the heat pipe just before it enters the dryer, and the stone to be dried enters through this pipe, the amount fed being regulated by a Link-Belt feeder. The discharge of the dried stone is through peripheral openings and this is covered by a hood which is connected to a fan that draws the hot gases through the kiln. This fan is direct-connected to a 25-hp. Allis-Chalmers motor. The dryer is driven by a 15-hp. Allis-Chalmers motor through a Ganschow speed reducer. The hot gases that pass through the dryer are freed from a great part of the steam that comes from the kilns by a fan which draws the steamy portion from the kiln chamber.

The dried stone contains considerable material that needs no grinding. This is taken out by a 10-mesh "Hum-mer" screen to which the discharge from the dryer is elevated. The oversize of the screen is sent to a four-roll Raymond mill. The undersize goes by a chute to an elevator that lifts it to a screen conveyor that feeds into the silos in which the product is stored. A part of the rejections from the air separator of the Raymond system joins the screen undersize, the two making one of the products complying with the Ohio law which specifies the grading of agricultural limestone. The products of this pulverizing plant are:

Whiting; this is a very fine material of which 99% passes 300-mesh.

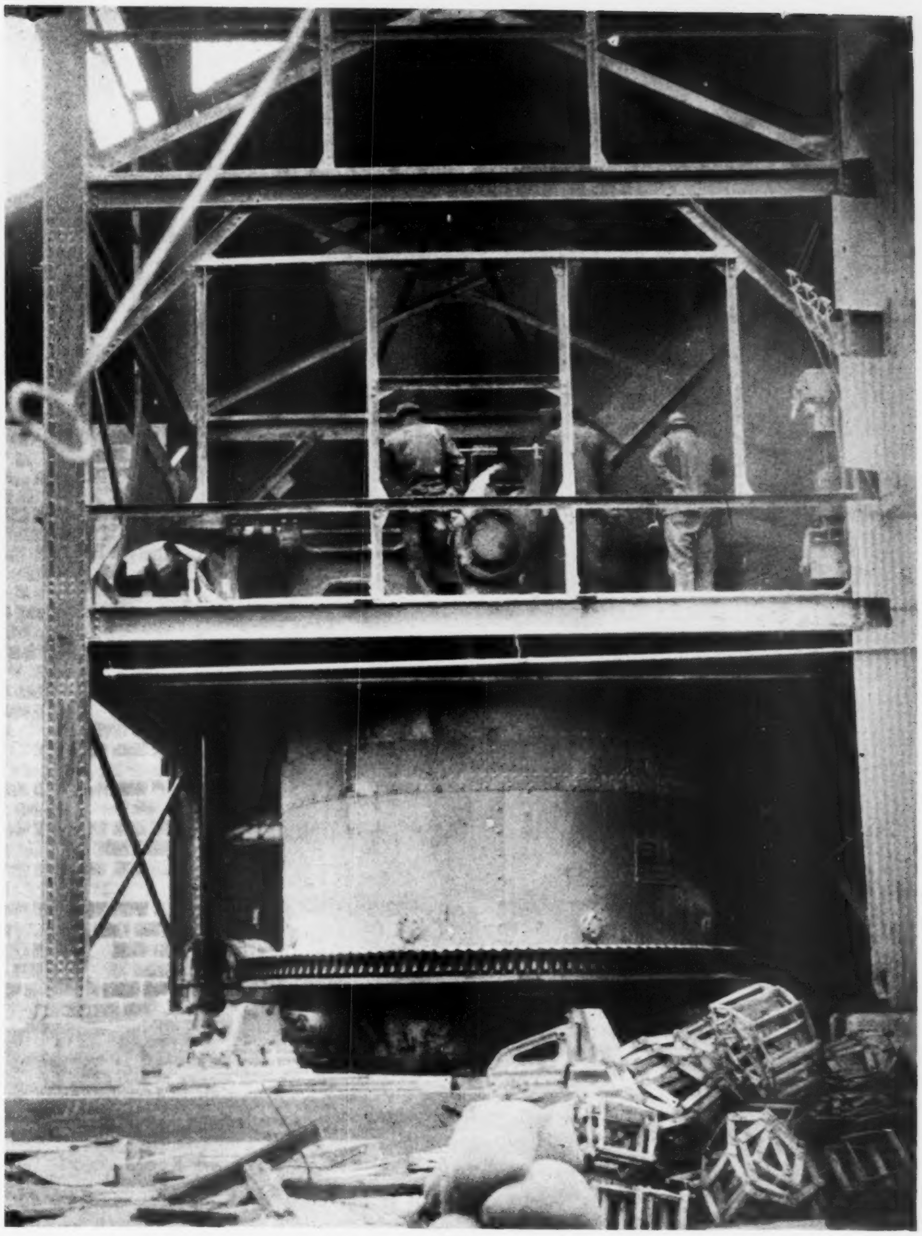
Asphalt filler; ground finely enough so that 80% will pass a 200-mesh sieve.

Agricultural limestone, of which 80% will pass 100-mesh.

Agricultural limestone, of which 45% will pass 100-mesh.

The company also ships agricultural hydrate under its "Marble Cliff" brand from the lime plant and the "Franklin Brand" of agricultural limestone meal, from ¼-in. down to dust. This is one of the products of Plant X.

Excellent construction marks both the lime plant and the agricultural limestone plant. Structural steel and concrete blocks have been used throughout, making a building that is not only fireproof but durable and good looking. The design is practically straight-line throughout. The stone comes in between the kiln house and the agricultural limestone plant and goes both ways, kiln stone from north to south through kilns and hydrator to the lime silos, and agricultural stone from south to north through the dryer and Raymond mill to the agricultural limestone silos.



One of the gas producers supplying fuel for the rotary kilns

Mixed Mortar Plant

The mixed mortar plant is quite a recent addition to the business, and it is one of the neatest and most compact plants of this kind that has been noted. It is placed near the lime plant and draws its supply of lime from one of the silos. A gate from a silo regulates the amount that goes into a pipe connecting with a closed-in drag chain conveyor. This conveyor works in a steel box which is under the road that passes between the lime plant and the mortar plant. The drag conveyor discharges into another conveyor of the same type which drags the hydrate up to the top of the plant, where it is measured before being placed in the mixers.

The aggregate ("limestone sand") is brought in by cars from the storage piles in a steel hopper-bottomed railway car and dumped in a concrete bin about 80 ft. long and 20 ft. wide. In the bottom of this hopper are two drag conveyors which bring out the sand to a drag conveyor running on an incline which drags the sand to the mixers.

In passing it may be mentioned that engineers of experience doubted the success of a drag chain conveyor working in hydrated lime. But the chain has proven itself satisfactory in every way. It is a Jeffrey drag chain of the same type that would be used in a chain and sprocket drive with links 6 in. by 9 in. The same type is used in the conveyors that bring out the sand from the bins under the tracks. These chains work

buried under the sand, but the pressure above does not affect them, as only 3 hp. is required to run them under full load.

There are three mixers which were made by the Handy Sack Bailer Co., whose engineering department, along with R. H. Pausch of the Marble Cliff Quarries Co., developed plans for this very unique and efficient plant. The reason for more than one mixer is that colored mortars as well as white mortar are made, and for the same reason there are six bins into which the mortar is discharged from the mixer. Two of these are for plain mortar and four for the colors for which there is the greatest demand, chocolate, black, buff and red. These colored mortars are principally used for laying up face brick. The company is closely allied with a face and common brick manufacturing enterprise called the Claycraft Mining and Brick Co.

Asphalt Road Material

The mixed asphalt road material plant is near Plant B. The product is known as Scioto Rock Asphalt and it is a hot mixed material which is laid cold. Special care has been taken to work out a mixture of aggregates which will be as voidless as possible, and a filler limestone dust from the pulverized limestone plant is used.

The asphalt plant consists of an Iroquois asphalt mixer with drums and fuel oil containers.

Scioto Rock Asphalt has been given a number of pretty severe tests to prove that it will not creep under heavy traffic. It has been placed on the grades leading to some of the railroad crossings in Columbus where conditions were unusually severe, and it has stood the test well. The product is sold for both new road work and repair work. The roads around Columbus are very largely of the bituminous type and are so well known that engineers from other parts of the country often visit Columbus to study the construction methods used. The Marble Cliff Co. has worked closely with the highway engineers to see that the construction and type of road were satisfactory.

A Consolidation of Quarries

This briefly gives an outline of the business as it is carried on today. But something should be added to show from what roots it sprung and how it came to be the great enterprise that it is. It was formed in 1914 by consolidating four quarries operated by the Casparis Stone Co. (which, of course, has no connection with the present company of the same name in Columbus). Woodruff and Pausch, the Columbus Stone Co., and the Scioto Stone Co. R. H. Pausch, the company treasurer, originally of Woodruff and Pausch, and W. J. Keever, who founded the Columbus Stone Co. and the Scioto Stone Co., are interested in the Marble Cliff company not only financially but actively. Mr. Pausch started with the Woodruff and Pausch Co. in 1903, but Mr. Keever's connection with the stone business in Columbus goes back to 1890, when crushed stone first began to be used in Columbus, and it was from Mr. Keever that the data for the summary which follows were obtained.

Columbus was founded in 1812 and quarries were opened for building stone almost as soon as building was begun. The state capitol was put up from Marble Cliff stone about 1851, convicts from the state penitentiary being used as laborers. Later small block leasers worked the quarry for building stone, receiving $1.35 a "perch" of 3000 lb. This was hand quarried and squared to building blocks by hand, so quarry labor must have been cheap in those days. The toll pike to the quarry, put in by Benjamin Brown, A. D. Rogers and Michael Sullivant in 1862 and '63, was one of the earliest stone roads in Ohio, and it was a "knapped base" road, which means that all the stone for the base was broken by hand hammers. Knapping was a trade in those days.

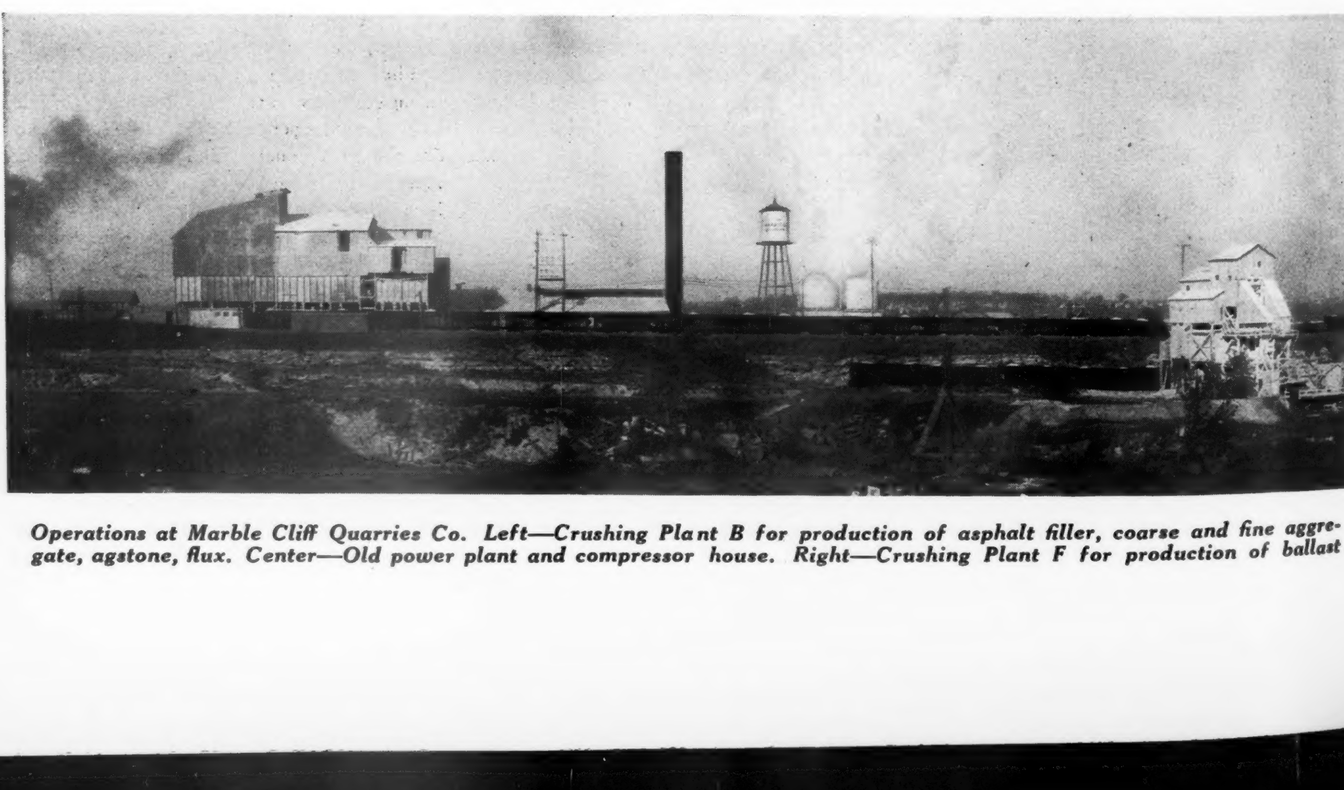
Crushing Rock 36 Years Ago

In 1890 Phelps, Taylor and Keever (W. J. Keever) started a stone crushing plant with a No. 3 Gates gyratory. A No. 5 Gates was soon after added and production pushed up to 35,000 tons per year. City paving furnished the only market for this stone, which was used as a base for brick paving. The stone was rolled and 1½ in. of sand from the river was rolled in afterward. Then came a layer of oak plank and then a sand cushion and finally the paving brick. Everyone in the building material business apparently got in on paving contracts in those days, with lumber, sand, brick and stone entering into construction.

Mr. Keever's company bought what was known as the Lilly quarry in 1892, and in 1893 what is still known as the "hobo quarry." This was operated in those dark days of American industry, the period of 1893 to 1896, when the land was full of men hunting a job. Every freight train brought a fresh supply of quarry labor, hobos, who worked a few days and then went elsewhere. It was not very efficient labor, but the wage was low, 95c a day being the going wage of the district for a time. Freight rates were low, too. The 25-ton coal cars were just introduced at that time (20 tons had been the maximum before), and by loading all they would hold the flat rate of $2 per car to Columbus worked out to something like five cents a ton. Today the lowest rate is 50c a ton.

Later Mr. Keever started the Scioto Stone Co. and had what was an enormous contract for those days, a ballast contract for 500,000 tons. The regular price for ballast at that time was 43c a ton, but he took this contract for 38c because the specifications allowed it to be made over a 1-in. screen. Later the railroad company (they sent engineers to measure the screen in the night) found that 1-in. stone would not make good ballast and had to make a new contract at a better price. The old Columbus Stone Co.'s plant is still used by the Marble Cliff Co. as a ballast plant and has been previously mentioned as Plant F.

The Casparis Stone Co. began business almost as soon as Mr. Keever's first company, in 1893. This had a No. 6 crusher, which was considered very large at the time. The Casparis Co. worked the "top rock"



Operations at Marble Cliff Quarries Co. Left—Crushing Plant B for production of asphalt filler, coarse and fine aggregate, agstone, flux. Center—Old power plant and compressor house. Right—Crushing Plant F for production of ballast

on the east side of the river, shooting it down where it overhung and hauling it in wagons to the crusher. The Casparis company put in the first steam shovel in the district in 1908. It was of the "whirligig" pattern with ropes where chains are used today. A little later Woodruff and Pausch brought in a Marion No. 60 shovel, and still later Mr. Keever bought a Marion No. 75 for the Scioto stone quarry.

S. Casparis, as he always signed himself, was one of the founders of the crushed stone business in the United States and was interested in a number of quarries. His name is probably as well known as any among those of the pioneers of the industry and his sons have continued in the same work.

Woodruff and Pausch brought the first large crushers of modern type into the field. They started with a No. 10 but afterward installed a No. 21, both of Allis-Chalmers make. The No. 21 is still functioning as the primary crusher in one of the present Marble Cliff plants.

Effects of Consolidation

After a consolidation had been formed of these companies, in 1914, it became possible to do things on a larger scale and to carry out plans which were difficult for the individual companies to put through. Washing the stone was one of these. Mr. Keever said the Scioto Stone Co. had considered washing for four or five years and had made some plans for the work, and so, it is presumed, the other companies had done. When the companies were brought together it was found that 700,000 to 800,000 tons of material, including quarry waste, would be available for washing, and a plant was begun. Washing stone was not as common a practice as it is today and there were little data available. The type of screen adopted was one which had proven itself in gravel washing, but the scrubber designed by Allis-Chalmers had to be worked out without experience, and so later did the sand boxes.

The possibility of washing the fines from the quarry into sand was suggested by noticing how the rain washed "sand" from the piles of waste. The word sand without a qualifying adjective is confined to the natural product, according to A. S. T. M. specifications, yet it would puzzle those who drew those specifications to say whether this was a natural or an artificial product by looking at it. Examination under a glass shows it to be largely limestone, and yet there are crystals and bits of siliceous rock (from the highly siliceous top rock) that gives it all the appearance of natural sand. And the success of the Marble Cliff company in making and marketing such a product has been an example to other companies who are wondering to what use they can put the fines that were previously wasted.

It was only possible for the larger company to introduce enocomies in the way of transportation and handling. An example of this is found in the Woodford centrally controlled haulage system, which meant a large initial investment but which has reduced transportation costs very considerably. The same thing applies to the building of the lime plant and even more forcibly to the permanent construction necessary to carry on the work on a large scale. The property is divided by the Scioto river, which had to be bridged in two places. These bridges are permanent structures such as a railroad would build—one being steel and another concrete.

So, perhaps, the greatest factor of all in the elimination of waste has been that of organization and direction, the appreciation of the fact that the methods of the 90's were no longer applicable and that new conditions demanded larger and more efficient plants and later designs of equipment.

The officers of the company are: W. H. Hoagland, president; H. J. Kaufman, vice president and general manager; Russell Rarey, vice president in charge of sales; and R. H. Pausch, secretary and treasurer. H. R. Welch is general superintendent and R. W. Bowen is his assistant. J. S. Sutton is purchasing agent and P. C. Hodges is traffic manager and assistant general manager.

Manganese Deficiencies in Soils and Fertilizers

RECENTLY the effects of manganese in various forms on soil fertility have been the subject of further study by the Bureau of Plant Industry, Washington, D. C. These investigations, reported in *Industrial and Engineering Chemistry,* indicate that as an oxidizing agent, catalyst or as an essential element like iron, there is a possibility of manganese exerting a profound influence on soil fertility through its effect on the chemical and biological processes in the soil.

The particular example offered was the case of the highly calcareous soil of the glades in Dade County, Fla., which failed to produce a crop of tomatoes even with heavy application of inorganic fertilizer unless stable manure was applied to the young plants. The addition of manganese sulphate in small quantities (25 to 50 p.p.m.) to a balanced inorganic fertilizer not only gave an excellent tomato crop but the quality and yield was the highest under all conditions. These experiments demonstrate that beyond doubt manganese is indispensable to the normal growth of the tomato plant under the conditions existing in this glade soil. Other soils whose natural fertility does not warrant exploitation may fall under this same class and similar experiments may prove this infertility to be due to deficiency or low availability of the manganese present.

The conclusions drawn are that future fertilizer practice must take into consideration the role manganese and other elements play in plant growth and function. All the experiments show that with poor soils, which have been livened to neutrality the results with manganese are best. As a precaution it is noted that the amounts to be added are exceedingly small and care must be exercised not to supply excessive amounts which might cause toxic effects.

Limestone for Sewage Filters

LIMESTONE quarrymen and sanitary engineers will welcome a forthcoming publication on the subject of qualities desirable in stone to be used for filter beds in sewage treatment plants. In view of the great quantities of stone required for this purpose—650 carloads in one plant for a town of 25,000 people, for example—it becomes very desirable to establish standard tests to indicate how a given stone will resist disintegration when used in filters.

The Illinois State Geological Survey has prepared a suggestive list of qualities desirable in filter stone and has devised laboratory methods of testing for these qualities, as described in its *Report of Investigations No. 12,* which is to be issued presently for distribution to all who may be interested. This report was written by J. E. Lamar, geologist of the division of non-fuel products of the survey.

The desirable properties of a good filter stone are specified as follows:

(1) The stone should be of minimum apparent porosity.

(2) The pores of the stone should be small and evenly distributed.

(3) The stone should consist of well-interlocked crystals or, if it is granular, the grains should be firmly bonded by a strong cement.

(4) The stone should be of approximately uniform solubility.

(5) The stone should be free from minerals which oxidize or hydrate. Pyrite and marcasite especially are to be avoided.

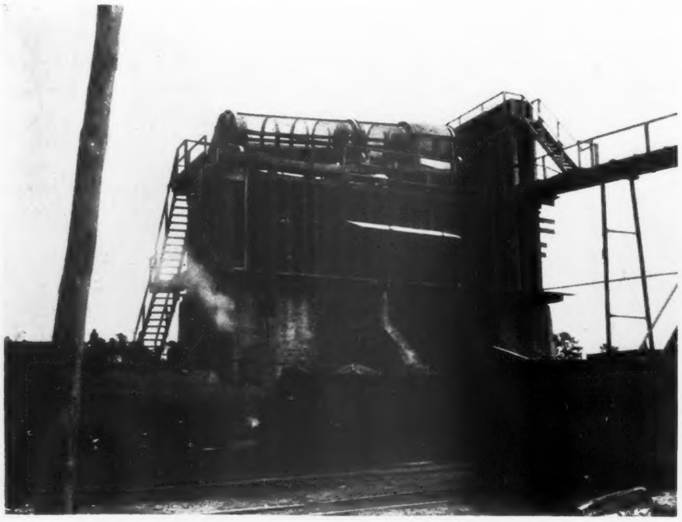
(6) The stone should have a sufficiently rough surface to furnish anchorage for the bacteria which are to grow upon it.

(7) The stone should be comparatively pure chemically. Stones with high clay contents are generally to be avoided. A high siliceous content is probably not harmful if the silica occurs in fine crystals evenly disseminated.

(8) The stone as delivered to the filtering plant should be free from dirt or fine rock particles which might collect in and clog the basal portion of the filter bed.

The laboratory tests designed to furnish a basis for judging the comparative merits of different limestone and dolomite filter stones, both mechanically and chemically, are grouped as follows: (1) accelerated soundness test; (2) freezing test; (3) absorption test; (4) microscopic examination; and (5) solution tests, including etching by hydrochloric acid. Tests for hardness, toughness and wear are also evaluated.

A copy of the complete report may be obtained for twenty-five cents (in stamps) by addressing Dr. M. M. Leighton, Chief of the State Geological Survey, Urbana, Ill.



Long screen at Dixie Sand and Gravel Co. plant

Gravel barges on the James river bound for Norfolk

Concrete Aggregate Industry in Virginia

Gravel in the East and Stone in the West —Some Peculiarities of Operations in Both

By Edmund Shaw
Editor, Rock Products

THE state of Virginia has abundant and unusually varied resources of material for building highways and for concrete aggregates, so that in no case is it necessary to carry material over very long distances. As for variety, the list comprises sand and gravel, granite, trap (both diabase and basalt), limestone and sandstone. And all these may be had of good quality, so the state highway department specifications for "Grade A" stone are somewhat higher as regards toughness and hardness than they are in many other states.

C. S. Mullen, chief highway engineer, tells me that the state is spending about $8,000,000 yearly on its highways. The money is raised in part by a gasoline tax, by auto licenses, and by direct appropriation. Another source of highway improvement is the use of convict labor. This year about 100 miles of concrete road will be built, and 70 miles of bituminous macadam. The concrete specification is unusual in that it calls for a 1-6 mix, allowing considerable latitude in the proportioning of the fine and coarse aggregates, according to grading and the fineness modulus. With a specific water-cement ratio established, this would seem to be a very sensible specification. The bituminous macadam roads are laid with a 6-in. water-bound base and a 2½-in. penetration top.

East and West Divisions

The state is divided between the coastal plain (the "Tidewater") and the hill country by a line running almost straight south from Washington, D. C., through Fredericksburg, Richmond and Petersburg. East of this line gravel is the most available coarse aggregate; west of this line there is little or no gravel, and in some parts sand is hard to obtain. The best gravel deposits are around the three towns mentioned, except where the gravel is taken from the rivers, notably from the James river. The gravel seems to lie above a certain horizon, and while it lies on top of the ground in a great many places, only a few deposits are deep enough to permit working on a commercial scale. Shreve Clark, engineer of tests of the state highway department, told me of a survey that had been made to find other than known deposits on the road from Washington to Richmond, but no deposits of importance could be located.

West of this line there are numerous exposures of old rocks of not much value for road building (gneisses and schists), but beyond these are granites, traps and abundant limestone. Mr. Clark says that one can find almost any kind of limestone he wants in Virginia, from the very pure stone burned for chemical lime by the Liberty Lime and Stone Co., the Riverton Lime Co., and others (which is said to run 98% $CaCO_3$), to less pure limestones which are very hard and tough and make excellent road material.

The limestones are locally called "crystalline" and "amorphous," names which are perhaps more descriptive than exact. The "amorphous" stone is especially hard and tough, having a French coefficient of 8 and a toughness of 7. A very curious brecciated limestone is obtained near Leesburg which is made up of fragments of all colors from dark blue to dark red. It is crushed for road material and passes Grade A specifications, but it would make an unusually beautiful building stone.

Sandstones and Granite

In the southwestern part of the state is a locality in which coal is abundant. Here the rocks are the usual shales and sandstones found in coal bearing areas along the Atlantic coast. But even in this part of the state good road-building material may be had, for some of the sandstones have a French coefficient of 8 and a satisfactory toughness, so that they pass Grade A specifications. Near Norton, Va., which is in this locality, a sandstone deposit is worked for silica sand.

Granite, which is abundant and an important source of crushed stone in Virginia, varies somewhat in quality. In parts it is very fine grained and tough and makes excellent road material and aggregates; in other parts it is coarsely crystalline and shatters easily.

Careful in Choice of Aggregates

Although frost action is not so severe in Virginia as in some northern states, all gravel and stone used as aggregate in concrete highway has to pass the sodium sulphate soundness test, and most of the rocks submitted for testing pass it satisfactorily. I asked Mr. Clark especially about flinty

and cherty limestones. He said that limestones of that kind were not commonly found in Virginia, so the question of their durability had not come before him.

The state is careful in its choice of aggregates, for, like other states, it has had its experience. One road was spoken of which was laid during the war with imported cement and much softer aggregates than would be permitted today. It has disintegrated badly. This road is interesting because it is one of the few that shows actual wear from automobile tires.

Screenings Used in Fine Aggregate

As sand is not abundant in that part of the state where crushed stone is abundant, and as it is expensive to bring in sand from the coastal plain, screenings are used as fine aggregate as much as conditions will permit. Mr. Abbitt, of the state highway department, thought that about 30% screenings would be the average mixture. Trap rock and granite screenings are especially liked to mix with sand, and in proper proportions they make a stronger mortar than the sand by itself. This is in line with what has been found out in other parts of the country. (The North Jersey Trap Rock Co. is promoting the use of trap rock screenings with sand on the basis of tests which show that the mixture of sand and screenings, up to a certain point, make a much stronger mortar than can be made with the local sands alone.)

This use of mixtures of aggregates is something rather new in concrete mix design, but it seems to be well finished. Concrete products makers have largely adopted the use of limestone screenings with sand as standard practice, finding the combination makes a stronger product, one much less liable to crack through the webs, and less liable to slump with a high water content.

Track hopper and primary crushing plant of the Richmond Sand and Gravel Co., Richmond

Now mixtures of sand and trap rock and granite screenings are proven to have special qualities as fine aggregates in concrete road construction.

Mixtures of aggregates would seem to offer a good field for investigation. We have been so busy with such fundamentals of concrete mix design as the water-cement ratio that we have overlooked the fact that each of the commonly used aggregates has definite characteristics, and mixtures of aggregates may offer a solution to some of the problems of concrete mixing and placing.

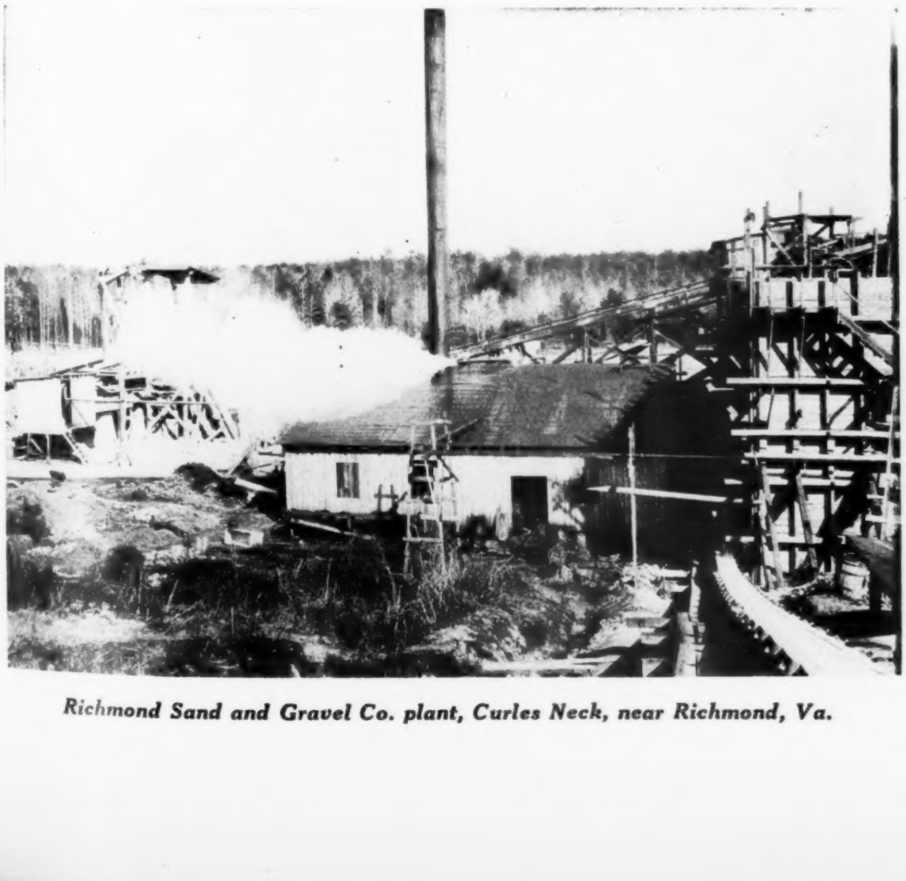
Characteristics of Gravel Operations

At this writing I have not seen any of the stone-crushing operations, but I have now visited the principal localities where sand and gravel are produced, except some of the river operations. I was at Fredericksburg two years ago and described the Massaponax company's operation in Rock Products, issue of July 25, 1925. This trip I have recently visited the plants of the Richmond Sand and Gravel Co., which is at Curles Neck, near Richmond, and that of the Dixie Sand and Gravel Co. at Petersburg.

There are many points of similarity in these deposits. Without having seen a geological report, one may surmise that they were all formed by swollen streams bringing down the rocks that had been broken by frost and heat from the hills above, depositing them in low places. Pieces of petrified wood, sometimes the trunks of good sized trees, are found deep in these deposits; trees that once stood in the low ground that was overflowed.

The stratification of gravel and sand, and the fact that in some places the deposits are almost all of gravel and boulders, while in other parts they are almost all sand, would indicate that there were seasonal rains of varying quantity. One may see what one would think to be the same kind of deposits of more modern origin in the big "washes," which are so important a source of sand and gravel to Los Angeles and other points on the Pacific coast.

At the Richmond company's plant, Mr. Abbitt and I looked over a pile of boulders that had been thrown out, and most of them were of a very hard quartzite. Some were of gabbro, locally known as "nigger heads." All were much waterworn and some had cuplike depressions as if they had been in the bed of a stream for a long time. As to the gabbro, Mr. Abbitt tells me that



Richmond Sand and Gravel Co. plant, Curles Neck, near Richmond, Va.

Draglines are used to work many of the Virginia deposits, as the lower parts are generally under water

there are inclusions of this rock found in the old schists and gneisses west of Richmond.

These boulders are an important source of material, as they are crushed and added to the gravel. At the Richmond plant the proportion appeared unusually large, and it was estimated that the crushed material made up fully 50% of the sizes above ¼ in.

Draglines Popular

At Richmond, Fredericksburg and Petersburg the ground is worked in about the same way, draglines being used to dig the bank material and standard gage railway equipment to bring it to the plant. At Richmond, owing to the number of boulders in the deposits, two crushers are used, a gyratory and a jaw crusher. At Petersburg the larger boulders are thrown out, as there are not enough of them to pay to install a large crusher to handle them.

The screening practice is somewhat unusual at the plants visited in Petersburg and Richmond, since long cylindrical screens, of the type more often found in crushed-stone plants, are employed. At all three localities pickers are kept at work on the plant belt to throw off roots and other trash before its gets to the screen.

Business Outlook Good

Everyone I have talked with says that business is just fair, but that prospects are for its getting better immediately. Highway improvement programs will take a lot of material, and Virginia is growing industrially, which means that more building will be needed. From reading the newspapers one gains the impression that the people want highways and are willing to pay for them; but apparently they are not willing to run in debt for them.

Aggregate To the Fore

THROUGHOUT the meeting last week of the American Concrete Institute ran the thread of the importance of aggregate as a major factor in good concrete. This was not planned by the program committee. There was no set group of papers on the subject. But the theme recurred in both paper and discussion. The shape, size, kind, quality and grading of the aggregate and the effect of all these on cost, density and strength of concrete came up again and again. This is significant, for of late there has been a tendency to subordinate everything in concrete making to the cement-water ratio. But concrete is not alone cement and water; its major volumetric content is some kind of stone and the quality and quantity of that stone not only affect the relations of the cement and water which form the binding medium but also the strength, to a degree the density and certainly the durability of the integrated whole we call concrete. This is not a new observation, but it needed emphasis, such emphasis as the speakers at Chicago last week gave it. The study of concrete is moving ahead fast, to the benefit of all who use it. In that study aggregate must take a leading place.—Editorial in *Engineering News-Record.*

Quality of Aggregate Important Consideration in Concrete Roads

AN example of the vital importance of quality or soundness of a crushed stone aggregate to the life of a concrete pavement, in which it is an ingredient, is given in a paper by H. S. Mattimore, engineer of tests and materials investigation, Pennsylvania Department of Highways, in a paper read before the American Road Builders Association convention last January.

The following extract is taken from his paper: "During the year of 1919-1920, in our own state we constructed one mile of concrete road with a local stone aggregate. A study of the surrounding ledges convinced us during the construction of the highway that the stone was of an unstable character; therefore, the concrete on the five miles of the remainder of the contract was constructed with stone from another source. Both sections of this contract were constructed by the same contractor, under the same engineering supervising personnel, and other than the change of coarse aggregate, the same materials were used. About the third year after completion, the section with the unstable aggregate showed signs of surface rupture. This has been progressive and at the present time, some five or six years after completion, the road is kept in suitable condition only at heavy maintenance cost. Meanwhile, the section of concrete with the sound stone aggregate has been in excellent shape for the entire period at average maintenance cost. Constant control, close observation of construction, detailed inspection of the quarry and of the surrounding exposed ledges, no doubt saved five miles of this road, of which the increased cost of maintenance alone would probably pay for material control on a number of projects."

Testing and Specifications for Slate

THE meeting of Committee D-16 on Slate, of the American Society for Testing Materials, held at the Bellevue-Stratford hotel, Philadelphia, March 15, was well attended, particularly by representatives of the architectural profession, government officials and others. The committee considered tentative methods of test for electrical insulation of slate, which is expected to be presented at the next annual meeting.

Consideration was given to suggested slight changes in the present tentative methods of testing slate for absorption and transverse strength as the result of experimental tests recently conducted at Lafayette College, Lehigh University and Rensselaer Polytechnic Institute. The tentative methods are expected to be advanced to standard.

Reports of various sub-committees were received and discussed, especially those on the weathering of slate. The tentative definition of slate was, with slight changes, incorporated in the report of the committee for this year as a standard definition of slate.

It was proposed that a sub-committee be appointed to consider abrasive sand for rubbing beds for slate, because of the great economies that could be effected through increased slate production, through the grading and selecting of sand for this purpose. Preliminary studies may be made in the laboratories of the U. S. Bureau of Mines at New Brunswick, in the anticipation of receiving the co-operation of the producers. The laboratories of Lafayette College have also been offered in co-operation.

The fall meeting of the committee will be held in the Pennsylvania slate regions.

The chairman of the committee is D. W. Kessler, associate engineer, U. S. Bureau of Standards, Washington, D. C. The secretary is D. Knickerbocker Boyd, structural standardist, Structural Service Bureau, Philadelphia.

Air Separation Methods Used in Fine Grinding of Rock Products

I.—Principles Underlying Air Classification and Some of the Machines Employed

By Edmund Shaw
Editor, Rock Products

FINE grinding is an essential part of the preparation of many rock products. Among these may be mentioned cement, lime, pulverized limestone, gypsum, pulverized silica, phosphate rock, ground slate, talc, soapstone (pulverized), and barytes. In fact, there are no non-metallic minerals of which the writer knows that are not prepared for some uses by pulverizing or very fine grinding. In addition the pulverizing of coal is now an essential part of the portland cement industry and to a lesser extent of other rock products industries.

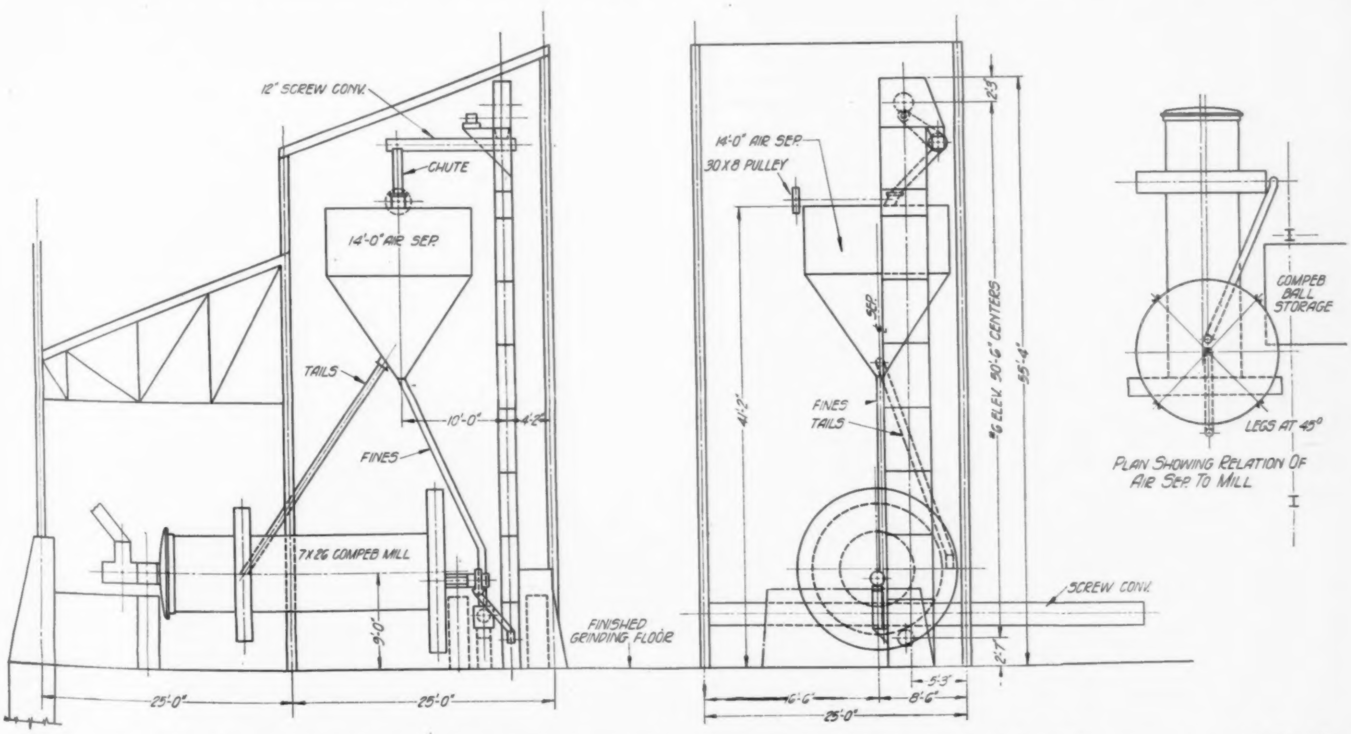
Many of the materials mentioned may be ground either wet or dry, but where it is possible to grind them dry this is the preferred practice. It is very difficult to dry a wet pulp of finely divided solids and water such as is obtained in wet grinding. The water will not drain off or filter off satisfactorily and the removal of the large amounts of residual water left after filtering or draining is expensive both for fuel and machinery. The dried product usually forms cakes or lumps that have to be broken up, or even reground, before they are in a fit condition to use. It is admitted that wet methods of grinding are satisfactory where they can be applied, especially the method of grinding in a stream of circulating water which removes the finely ground product as fast as it is made, and, by means of some form of hydraulic separator, sends back that product which is too coarse for further grinding. The application of this method to tube and ball mills has secured an output-capacity and a uniformity of product that were considered beyond the range of possibility before this method was applied. But the disadvantages of wet grinding just mentioned have been a handicap too severe to be overcome by the efficiency of the methods in many industries.

Outside of the rock products field dry fine grinding is applied to a number of organic substances such as cocoa for example. So it will be seen that the entire dry fine grinding field is a very large one.

Methods of Fine Grinding

There are three methods of dry fine grinding in use which are sometimes spoken of as "processing," "grinding with one pass" and "grinding with air separation of the product." Processing has only a limited use today, but it is still used to some extent in the grinding of silica for making the finer kinds of pottery. The machine employed is a simple cylinder or tube, which can be revolved, entirely closed except for a door which can be shut tightly. The tube contains a charge of flint pebbles which are the grinding media. A charge of silica sand is placed in the tube with the pebbles and the tube is revolved for some hours, after which it is stopped, the door is opened and a sample of the product is tested for fineness. If the fineness is not sufficient the tube is revolved for a second period or until the test of a sample shows the product to be sufficiently ground.

One-pass grinding is just what the name implies. The material to be ground is fed in an appropriate size to the machine (which

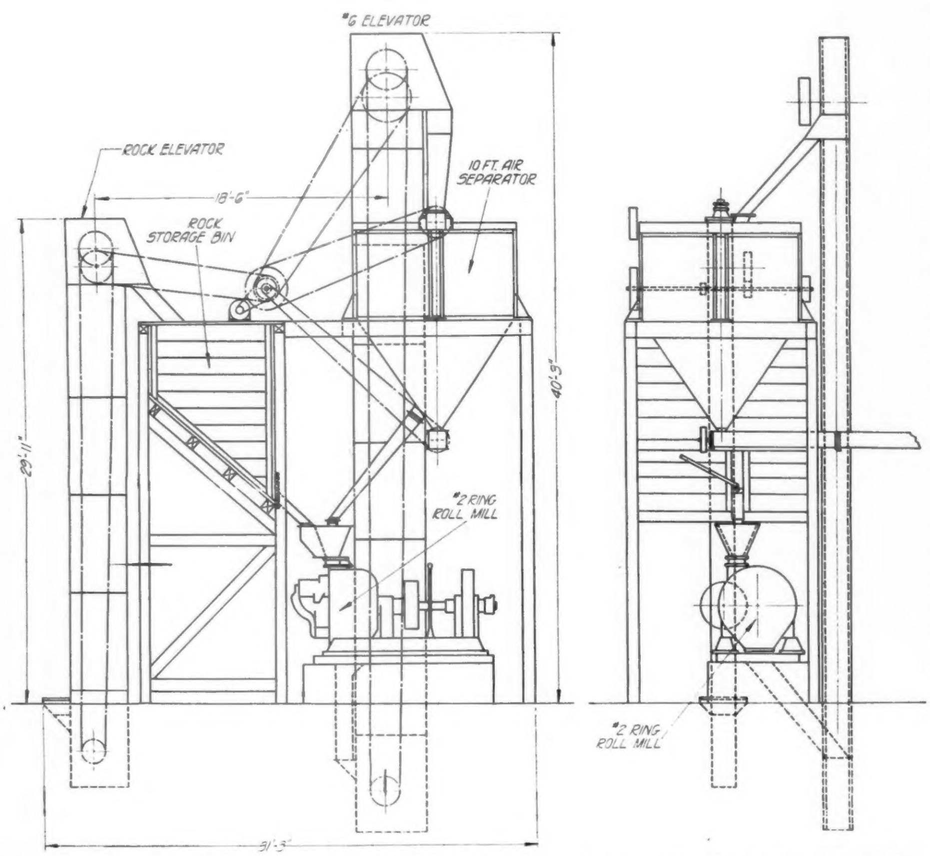


An air separator and compeb mill used in grinding cement clinker. The oversize (marked "tails") goes to a peripheral feeder on the second compartment of the mill. The fine product goes to a screw conveyor which may receive the direct discharge of the mill, if this is desired

may be a tube mill, a roller mill, an edge runner or a mill of the buhrstone type) and discharged in a finished condition. Evidently the more slowly the material is fed to the machine the finer it will be ground, so the control of the fineness of the product is by regulation of the feed. It is used in many industries. One of the most important applications of one-pass dry fine grinding in point of tonnage is in making portland cement by the dry process. It gives the best results where the material to be ground is fairly uniform so that the feed does not need constant regulation. Uniformity of moisture content is also desirable, for the efficiency of any dry grinding machine falls off rapidly as the moisture content increases.

In the air separation method the mill is discharged at such a rate that finished and some unfinished material are taken out. These are separated in an air separator and the finished product is sent to a collecting device while the unfinished product is sent back to the mill to be further ground. The air separator used may be one of several forms. These forms employ different methods and different principles, and even those which look alike do not work in the same way. It is these machines and their underlying principles which will be discussed in what follows:

The air separator is historically an old machine in one of its forms; in fact, air separation is older than history. Very early in the life of the race man learned to separate grain from chaff by tossing it into the air so that the wind would blow the lighter chaff to one side. The fanning mill which is a part of all threshing machines supplies a current of air created by a fan for the same purpose. But the method of blowing the lighter particles to one side is rather crude as compared with the method of a well designed air separator, although the fundamental principle is the same.



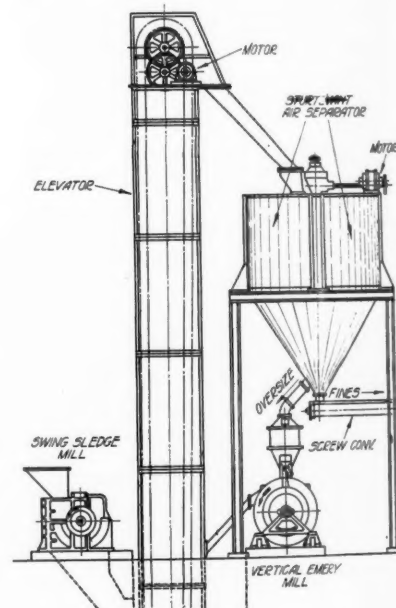
Plant for pulverizing limestone with air separator and ring roll mill in closed circuit

Sands, Dusts and Cloud-Forming Dusts

Before considering air separation it will be necessary to know something of the materials to which it is applied. The product of a mill grinding almost any non-metallic mineral may be divided into *sands, dusts* and possibly *cloud forming* dusts. Sands are those grains which are easily visible and which may be separated into sizes by screens or testing sieves. Dusts are made up of particles which will settle, although perhaps slowly, in still air. Cloud forming dusts are made up of very fine particles which will hardly settle at all in still air, their weight being more than compensated by certain electrical and physical characteristics which these very small particles possess. This is explained somewhat in detail in a recent article in ROCK PRODUCTS,[1] so only enough will be said of dusts to make what follows understandable.

The sand grains fall through the air very rapidly, almost as fast as they would fall in a vacuum. This makes their separation from the dusts a simple matter which may be accomplished in several ways. In the modern air separator there may also be some separation between sands, the finer grains from the coarser. About where the limit lies commercially for such a separation does not seem to have been well determined. If for the moment we consider as sand everything remaining on a 200-mesh screen and as dust anything passing such a screen, it appears that a number of separations may be made of the finer sands in air separators. Some makers of these machines claim to make good separations on all material finer than 80-mesh while others place the limit at 60-mesh and one maker recommends his machine for separations as coarse as 50-mesh and says that some separations have been made at 30-mesh. As such separations may also be made by screens it follows that a choice of separator for certain sizes may depend upon conditions or even on the operator's personal preference.

For dry material passing a 200-mesh screen (dust) there is no other satisfactory commercial separation device than the air separator. It is true that sieves of 325 meshes per lineal inch are in use and screens of 400 meshes to the lineal inch have been made. But it is very difficult to get material to pass through such fine openings and their use is wholly confined to testing in the laboratory. Even there they are not wholly satisfactory.



Combination of air separator with hammer mill and emery mill

The separation methods which may be used according to the sizes to be separated is graphically shown in Fig. 1.

Fall of Small Particles in Still Air

It has been shown that sand grains fall in

[1]See "Suspensions of Industrial Dusts in Air," ROCK PRODUCTS, October 30, 1926. A somewhat different classification of dusts, however, has been adopted for this article.

still air with almost the velocity of falling *in vacuo*, the velocity being found by what is possibly the best known of all physical formulas, $v = \sqrt{2gh}$. As the particles become smaller, however, this formula does not apply on account of the resistance of the air or the friction[2] of the air on the surface of the particle. This resistance increases as the velocity increases. It is evident that as the particle falls faster and faster the friction will increase until that part of the force which causes it to *accelerate* its motion is balanced by the frictional resistance. Then the particle will continue to fall at a constant rate.

The fall of particles through air or a gas or a liquid (because this phenomenon of a constant velocity is observed in all of these) has been thoroughly studied. What is known as "Stokes' Law"[3] expresses the relation of gravity and the resistance to falling in the following formula:

$$v = \frac{2g}{9\nu}\left(\frac{\delta}{\rho} - 1\right) a^2$$

in which the terms have the following values:

v = velocity of a sphere.
ν = the index of friction or viscosity.
δ = the density or specific gravity of the spherical falling body.
ρ = the density of the fluid (air, gas or liquid).
a = the diameter, 0.2205 in the case of the body studied.
g = 32.64 as in all formulas for falling bodies.

A general settling rate for some sizes of dust is given by Gibbs[1] as follows:

Dia. of particle in cm.	Rate of settling cm./sec.	meters/hr.
0.01	30.0	1080.0
0.001	0.3	10.8
0.0001	0.003	10.8 cm.
0.00001	0.0003	10.8 mm.

The material of the dusts is not mentioned. The following rates were found for the finer particles of cement as separated in the air analyzer, as given to the writer by Dr. J. C. Pearson, formerly with the Bureau of Standards and now with the Lehigh Portland Cement Co.

Dia. of particle in mm.	Velocity of fall in still air cm./sec.
.01	0.75
.02	3.00
.04	9.00

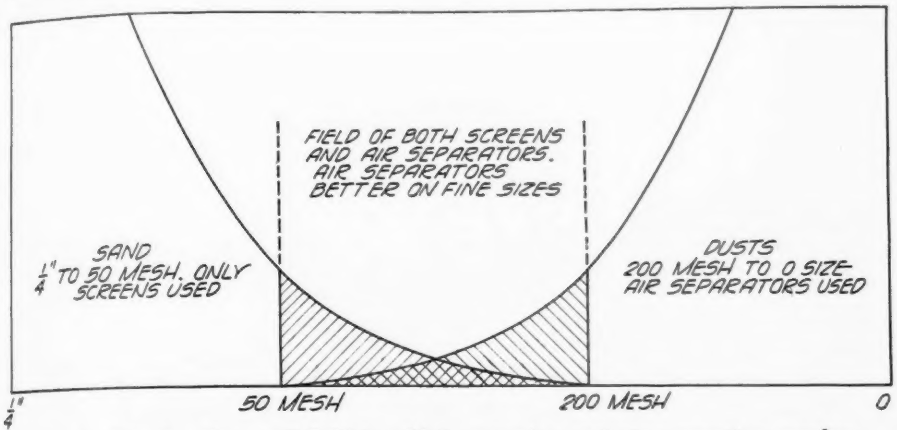


Fig. 1. Showing the small field in which screening and air separation overlap in fine grinding

The velocity is shown to be in proportion to the square of the diameter for these sizes, as it should be from Stokes' Law.

Pearson and Sligh, in their studies which led to the development of the air analyzer for separating cement into fine sizes, found that the fall of the finer particles followed Stokes' Law as given above. The studies began with particles of 10 microns diameter (0.01 mm.) and it was found that at about 50 microns the law broke down so that particles coarser than this fell with slightly accelerating velocities. These studies were made at the Bureau of Standards and the reader is referred to Technical Paper No. 48 for further information.

The cloud forming dusts are those which do not settle fast enough so that their rate may be observed. The reason why they do not fall may be the electrical charges which they carry on their surface. These particles are so fine that their combined weight is small in relation to the whole product of a mill. It is probable that many of them are settled by striking against the side of a cyclone collector although they may sometimes be seen as a faint cloud coming from the exhaust.

To sum up then, the product of a mill which it is desired to pass through an air separator consists of:

(1) Sands, fine and coarse, which may may be separated by screens easily. These are coarse enough to be completely separated so that they do not contaminate the finished product. They fall with an accelerating velocity almost approaching that of the formula $v = \sqrt{2gh}$.

(2) The finest sands and coarsest dusts which fall with a *slowly* accelerating velocity. Some of these may contaminate the finished product.

(3) The true dusts, say below 0.05 mm. in diameter which fall at a constant rate according to Stoke's Law.

(4) Cloud forming dusts that fall so slowly that the rate cannot be observed.

It is to be noted that these divisions are not sharply defined but that they shade into one another. No one can say exactly that all sizes on one side of a line fall according to Stoke's Law while those on the other side do not. However, it has to be borne in mind that such divisions exist in considering air separation.

Chemical and Electrical Characteristics

It has been mentioned that dusts hold electrical charges on their surfaces and this gives them electrical characteristics. It may also be mentioned that dusts adsorb gases on their surfaces which causes them to have certain chemical characteristics. Sometimes both characteristics interfere seriously with air separation. Owing to the charges of electricity they hold, the dusts of sulphur are very difficult, practically impossible, to separate by air currents. Pulverized burned lime is another substance that is so difficult to handle in air separating devices that screens are used in a commercial way to make a 50-mesh separation, which it is quite possible to make with air when other substances are treated.

Shape and Weight of the Particles

As in water separation, air separation is largely influenced by the shape of the particle. The separation of mica from other ground minerals is easily accomplished for this reason. Experimentally the writer once made a fairly good separation of mica with a very crude separator made from a pasteboard box in front of an electric fan. Graphite may be separated from other minerals quite readily because of the shapes of the grains.

The specific gravity of the particle to be separated also affects it, but the substances usually treated in air separators in the rock products industries have usually much the same specific gravity, running from 2.6 to perhaps 3.2. In applying air separation to metallic ores specific gravity plays an important part and many pneumatic jigs and other machines have been devised to take account of it. Perhaps the simplest of these is the "dry blower" which is used to separate fine placer gold from sand and dust. The same method has been applied to plants treating large tonnages of lead and copper ore.

In what follows when a particle is spoken of as heavy or light it really means that it is of a larger or smaller size.

(To be continued)

Fuller's Earth in 1925

FINALLY revised statistics on the fuller's earth industry in the United States have been just released by the Bureau of Mines, Department of Commerce.

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[2]Friction being used to cover a number of factors which make up the resistance.
[3]Named for an English physicist. See "Mathematical and Physical Papers of George Gabriel Stokes," published 1880 by the University Press, Cambridge, England.

Australian Limestone Quarry and Lime Plant*

Cave Hill Quarries Operation Has Some Unusual Features in Design and Production Methods

THE Cave Hill limestone quarry at Lilydale, Victoria, 27 miles from Melbourne, has been worked continuously for many years. The owners, the David Mitchell Estate, recently decided to remodel the plant, and a description of the main features cannot fail to interest many engineers, for not only are the production methods unusual, but the novelty of design attracts the attention of all who have studied this plant and its operation.

Fig. 1 is a general view of the quarry floor and faces from the top of which the overburden has to be removed in order that the wonderful limestone deposits may be worked.

The plant as it now operates can be best illustrated by the flow sheet in Fig. 2. This indicates how three separate primary products are extracted from the quarry faces, and, by mechanical handling, crushing screening and other processes, the following salable materials are produced: Sugarstone, used for the treatment of beet sugar; fluxstone, for the metallurgical industries; road material of any required size (the sizes indicated on the diagram are those specified for general use by the country roads board of Victoria); kilnstone, supplied to the kiln, is converted to burnt lime. This product is now hand-picked and sold as lump lime. However, an extension to the lime-producing plant is under construction, and when brought into operation this department will produce ground agricultural lime, lump lime and hydrated lime.

By the adoption of a carefully designed layout the crushing plant is able to dispose of all of the product taken from the quarry. The small amount of overburden and waste material is deposited in the waste bin. This is done by reversing the apron feeder.

Fig. 3 has been taken at the face of the burden and illustrates a No. 30-B Bucyrus crude-oil-driven ¾-yd. dipper shovel operating and dumping into side-tipping dump trucks, the latter being trailed to the dump by an electric mule or locomotive.

Fig. 1 shows, in addition to the quarry floor layout, the main and arterial truck lines to the various faces, and also illustrates the manually propelled V-body tipping trucks, of 1-cu. yd. capacity, carrying stone to the loading hopper at the foot of the hoisting incline.

The deposit is composed of strata of very pure limestone, which is ideal for fluxstone and burning lime, and a low-calcium high-silica stratum which, being extremely hard, makes a first-class road metal and concrete aggregate. The strata vary in thickness from 18 in. to 12 ft. and the ratio of limestone to road metal is approximately 1 to 1. Due to volcanic disturbances, this deposit lies on an angle of about 80 deg. to the horizontal, and has a definite plane of bedding as seen in Fig. 1. Due to the peculiarities of the formation, hand loading is necessary. Small shots are placed into Jackhamer-drilled holes, and spawling to one-man size stone only is necessary.

*Reprinted from *The Commonwealth Engineer.*

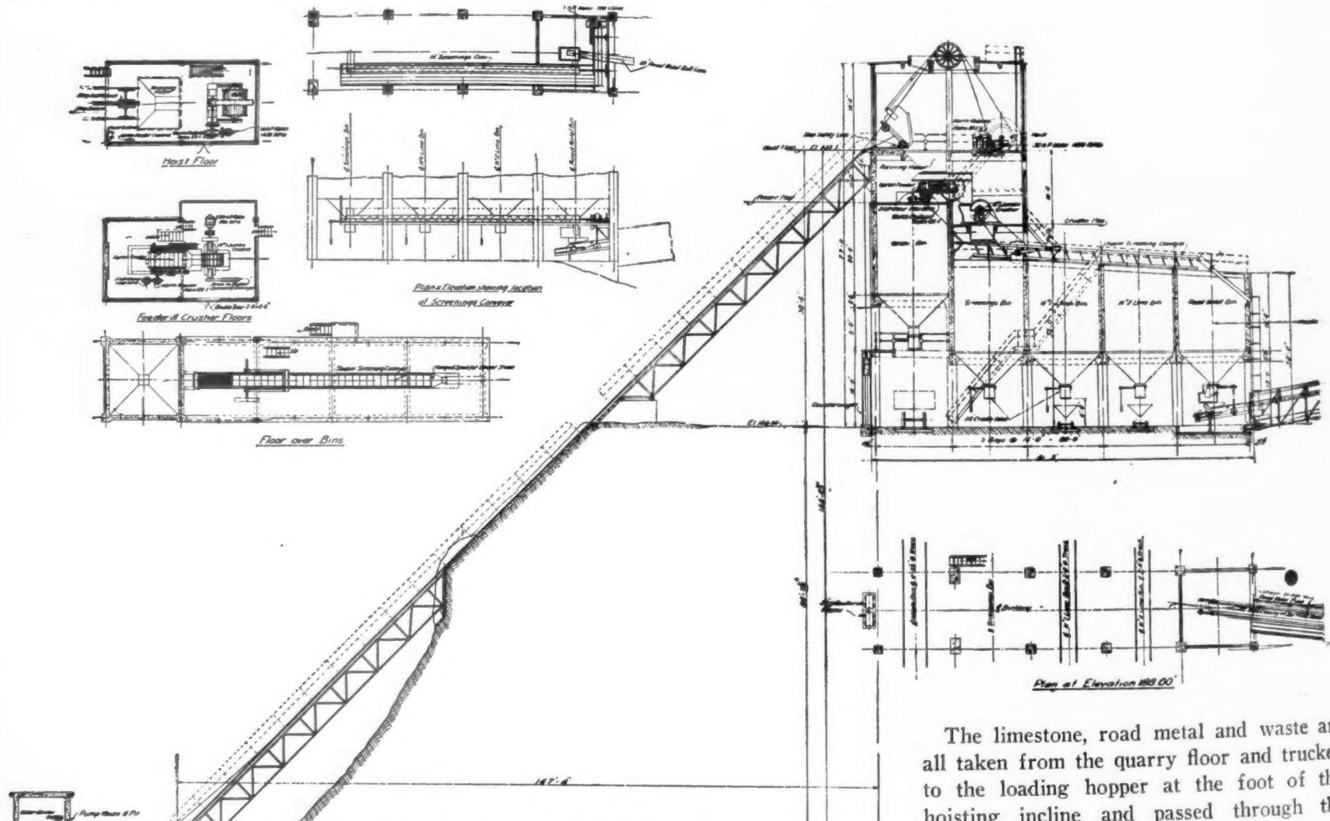


Fig. 4. Cross section elevation of the main crushing plant

The limestone, road metal and waste are all taken from the quarry floor and trucked to the loading hopper at the foot of the hoisting incline and passed through the crushing department. The loading hopper is erected over a pit for the reception of the hoisting skips and is a part of the drainage

Fig. 1. General view of quarry floor showing track layout

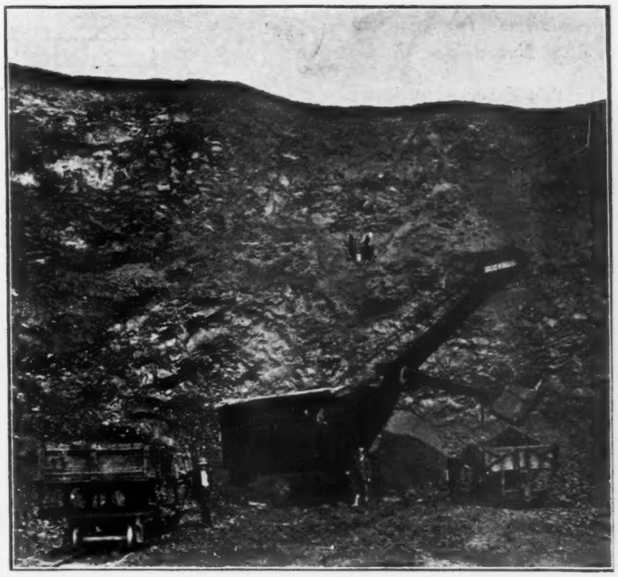


Fig. 3. Crude oil-driven shovel loading at the quarry face

sump which permits ground water to be kept at a constant level below the quarry floor.

The lower section of the pit acts as a sump for the intermittent discharge of the water by a small motor-driven centrifugal pump. The motor house of this pump is built of heavy reinforced-concrete roof and walls to afford protection to the men when blasting.

Fig. 4 is a cross sectional elevation of the main crushing plant. This figure together with the flow sheet of Fig. 2 shows clearly the methods adopted. It also indicates the hoist incline and the method of hoisting to the crushing plant by means of two balanced skips having a capacity of five tons each.

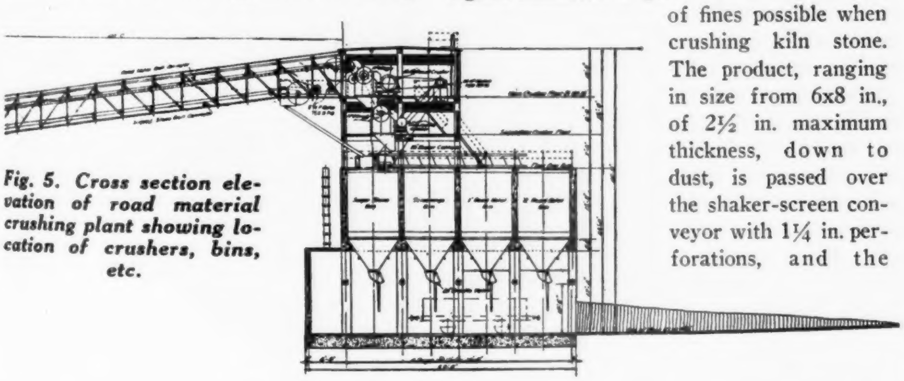


Fig. 5. Cross section elevation of road material crushing plant showing location of crushers, bins, etc.

A double-drum skip hoist 60 in. diameter, grooved for 1 in. cable and driven through a worm gear by a 30 hp. motor, is used to elevate the material from the quarry floor to the crushing plant, the braking being controlled by a solenoid, and also a hand brake for emergency purposes.

The skips dump their 5-ton load into the receiving hopper, from which the stone is delivered by a steel apron feeder, 3 ft. 6 in. wide, into the crusher, or by reversing the feeder, waste is delivered into the waste bins. The apron feeder is driven by a variable speed control motor by which the feed can be mechanically adjusted to suit the variation in stone and the capacity of the crusher.

This crusher, a hammer mill type, which is driven by an 80-hp. motor, is operated with breaker plate only, with specially-designed hammers to give the smallest amount of fines possible when crushing kiln stone. The product, ranging in size from 6x8 in., of 2½ in. maximum thickness, down to dust, is passed over the shaker-screen conveyor with 1¼ in. perforations, and the fines are passed into the screening bins, the remaining kiln stone is delivered into the Nos. 1 or 2 limestone bins, each having a capacity of 200 tons.

Road Stone

When road metal is passed through the crushing plant the discharge openings of the shaker-screen conveyor over Nos. 1 and 2 limestone bins are blanked off and the product passed into the road metal bin, the last of the series in the main crushing plant.

The road metal is fed from this bin by a cradle feeder onto a belt conveyor and delivered to the road metal crushing plant. The screenings from the screening bin are delivered by a screw conveyor, fitted with an adjustable feed grate, to the same belt conveyor, and passed on to the road metal crushing plant. Screenings may be run independently if desired.

Fluxstone is produced by delivering kilnstone off the end of the shaker-screen conveyor, down a vertical retarding spout, and delivered into the sugarstone bin in the road metal crushing plant.

Sugar stone is produced similarly, except that the shaker conveyor is fitted with a bar screen over No. 2 limestone bin and all kiln stone over 4 in. passes on as sugar stone.

The road metal crushing plant (Fig. 5) is equipped with jaw crushers, each being preceded by an adjustable rotating grizzly. The grizzly, by removing the fines, materially increases the capacity of the crushers.

Novel Method of Charging Lime Kilns

Another interesting feature of the plant is the utilization of a 7-ton petrol-driven Whitcomb locomotive for charging the kilns. It has been found after several months' operation that, even in spite of the short radius curves around the top of the kiln, no running troubles have occurred, and, with the side-tipping cars used, this method of charging the kilns has been found to be decidedly economical. Further, this equipment has permitted the adoption of a new method of supplying fuel to the mixed-feed kilns.

After the charging train has received its load of limestone from the lime bins, it is then propelled back to the coke heap and a definite quantity of coke fuel is placed on the top of each truck load of kilnstone, and, while this method of fueling a mixed-feed kiln might be considered novel, it has undoubtedly proved of great value both from a viewpoint of lime-fuel ratio and particularly in the nature of the product yielded by the kiln.

Provisions for Future Extensions

In this description it will be noticed that reference is made to the extensions which are being made at this plant to deal with the hydration of lime, and, while it is generally conceded that the lime industry of Australia has been slowly declining over the past decade, very few realize that an equivalent decline was occurring in America prior to the war, and the building trade of that country today claims that the introduction of the practice of lime hydration in their lime plants was the actual cause of the revival of their rapidly declining lime industry.

The whole of the design, together with the supervision during construction, was carried out by Messrs. Gilbert, McAuliffe Pty. Ltd., consulting engineers, Melbourne, Australia.

(Since publication of the above article Messrs. Gilbert, McAuliffe Pty. Ltd. have installed the first hydration plant in Australia, at the Cavehill Quarries, Lilydale, Victoria.)

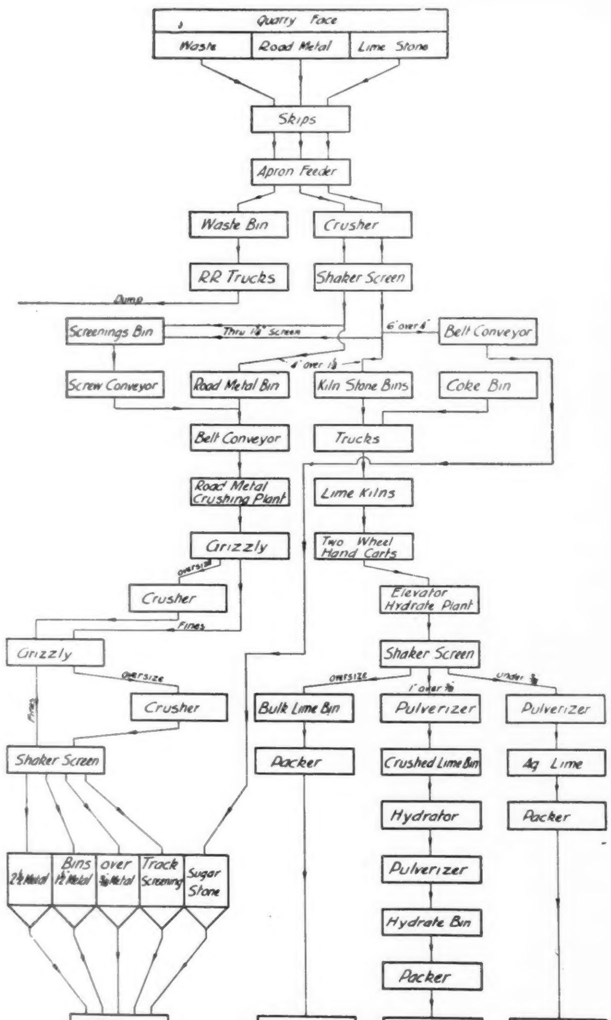


Fig. 2. Flow sheet of operations of the Cave Hill Quarries, Lilydale, Victoria, Australia

Concrete Roads Growing in Popularity in Great Britain

THE following item from the British *Contract Journal,* of February 23, 1927, is of particular interest to all producers of portland cement and aggregate because Great Britain has always been a stronghold of the macadam type road:

"More square yards of concrete-surfaced roads were laid during 1926 than during the whole of the previous three years. This increase was due chiefly to the fact that cities and large towns have become interested in this surface by reason of its cleanliness.

"Manchester and Liverpool head the list in Lancashire, while Middlesbrough, Hull and York lead in Yorkshire. Manchester laid 41,826 sq. yd. during the year —a record for any English city.

"In the Southwest, Bristol has now completed 25 roads, and at Bath the section in the Lower Bristol Road is now five years old.

"In the center of England, Birmingham has caught the infection, while Crewe has continued its program, and Wolverhampton has a good section of the trackless tramway route.

"London has always prided herself on having the best roads in the world, and we find no less than 128 concrete roads in Southwark, while 16 other London boroughs have actually constructed or are about to construct roads of this type.

"Scotland, conservative as it is, has several good examples, particularly in Perthshire and Fifeshire, and stretches are being laid in the New Edinburgh-Glasgow arterial roads, and also between Perth and Inverness.

"Wales has some excellent examples at Cardiff and a long strength in the North in Flintshire.

Some Good Examples

"There is no doubt that this surface is becoming amazingly popular; residential areas at Herne Bay in Kent, Malden in Surrey, and Tilbury in Essex are good examples; and with estate development syndicates, its attractions are obvious, since it has been found economical to lay this type of road for use during building operations and afterwards hand it over without any more expense to the local council. Examples of this may be seen either in course of construction or completed at Surbiton and Raynes Park.

"Undoubtedly the introduction of rapid hardening portland cement has been of extreme value, allowing, as it does, the surveyor to open the road a few days after the surface has been finished. A most interesting example of this is a stretch of road laid on the Chelsea embankment, London, where 'Ferrocrete' was used. When the coal strike started this road was barely completed, but it was, however, essential to open the entire width, as the motor traffic along the embankment was enormous. Although only a few days had elapsed, the chance, as it appeared to be then, was taken and the road at once proved its metal and acted up to all the claims put forward by the makers of the cement.

"During the year two experimental lengths have been constructed under the auspices of the Ministry of Transport in Middlesex and Kent, and it is hoped that the ministry will be able to supply useful information covering different forms of construction.

"Other experiments have been the armoring of the surface with grids at Middlesbrough, Southwark and Chelsea, and experiments with a surfacing called 'Betonac,' which is a mixture of finely graded metallic particles and cement.

The Question of Design

"As far as actual design is concerned, very little change has taken place; there has been a little criticism of some of the alternate bay work, as it appears that much greater care has to be taken to ensure smooth riding when this form is adopted, much more so than with either the continuous or the strip methods.

"The use of limestone in the top surface has not always proved satisfactory, nor have the pit gravels which contain a noticeable percentage of sandstone, otherwise the materials found in each locality have proved successful.

"It may be stated that where the above two materials are obtainable they can be used in the bottom course, but a more suitable aggregate must be introduced in the top course.

"The use of reinforcement has been very general, and although it seems unlikely that any stereotyped rules will ever be laid down as to its use, yet it has proved beneficial in a number of places, especially over a bad sub-base.

"More than one firm has undertaken the construction of these roads giving a 10 years' maintenance guarantee, and this shows that faith in the future of concrete roads has grown amongst the contracting element."

Steam in Limestone Decomposition

Contrary to General Belief Steam Does Not Help Calcination—Actually Hinders Process

By Victor J. Azbe
Consulting Engineer, St. Louis, Mo.

FOR many years there has been a theory that steam in the gaseous atmosphere surrounding the limestone lowered the decomposition point. Many claimed that the steam acted as a catalytic agent, saving fuel and exerting some mysterious influence which resulted in better lime. Professor Herzfeldt, many years ago, demonstrated that with steam at a given temperature much more limestone will be decomposed in a given time than with heated air at the same temperature. Unfortunately, however, his apparatus did not lend itself well to control of volume and of composition so his experiments could not be considered conclusive. In the following are given the results of the

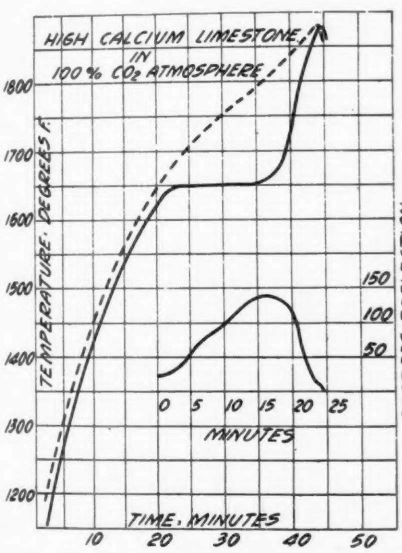


Fig. 1. Decomposition curve of high calcium limestone burned in 100% CO_2 atmosphere

author's investigation of the subject made with an apparatus described in May 15, 1926, issue of Rock Products.

Calcium and magnesium carbonate have a definite decomposition point which depends entirely upon CO_2 concentration, pressure and temperature. When limestone is burned in a chamber where CO_2 concentration is 100% and the pressure surrounding the decomposing $CaCO_3$, atmospheric, then the decomposition will take place at close to 1650 deg. F. The effects observed have been plotted in Fig. 1. The specimen under investigation continued to rise in temperature at the regular rate until the decomposition point was reached. At this point the furnace continued to heat but the specimen remained at about the same temperature until all the CO_2 was driven off when again an increase in its temperature was observed. This behavior is caused by the fact that heat is necessary in the process of separating CO_2 from CaO and the heat applied during decomposition becomes latent rather than sensible.

Fig. 2 gives results of burning the same high calcium limestone in an atmosphere containing only 33% CO_2. The decomposition curve appears quite different from that in Fig. 1. First it is noted that slight decomposition begins at 1500 deg. F., or 150 deg. F lower than when CO_2 concentration was 100%. Also the curve is sloping—not as flat as the curve in Fig. 1. In the former, CO_2 concentration was constant and so decomposition was going on at a more constant temperature, whereas in the second case since the decomposition started in an atmosphere of 33% CO_2, the gas film adjacent to the specimen soon increased in concentration because of the gas given off by the decomposing stone. This concentration continued as the process penetrated further under the surface. Evidently, with a dense limestone this slope would be more pronounced. In large specimens such as are generally used in a vertical lime kiln, the

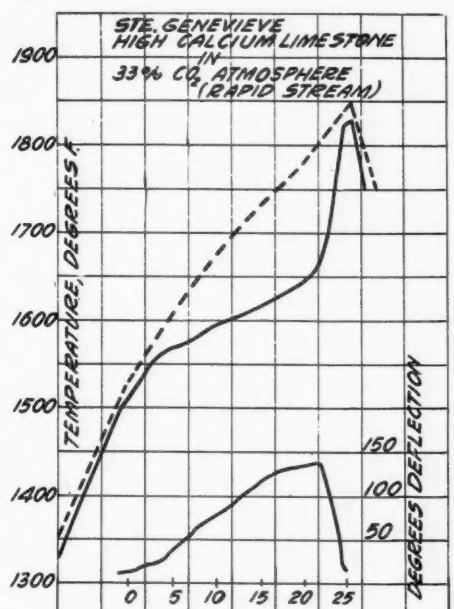


Fig. 2. Decomposition curve of high calcium limestone burned in 33% CO_2 atmosphere

outside atmosphere will probably exert an influence on a distance as great as 1-in. Beyond that point, concentration of CO_2 should be 100% and consequently the decomposition temperature 1650 deg. or more, its exact amount depending upon density of the lime layer and facility of the gas to escape without building up a pressure much above atmospheric.

Fig. 3 presents the transformation diagram of the same limestone burned in an atmos-

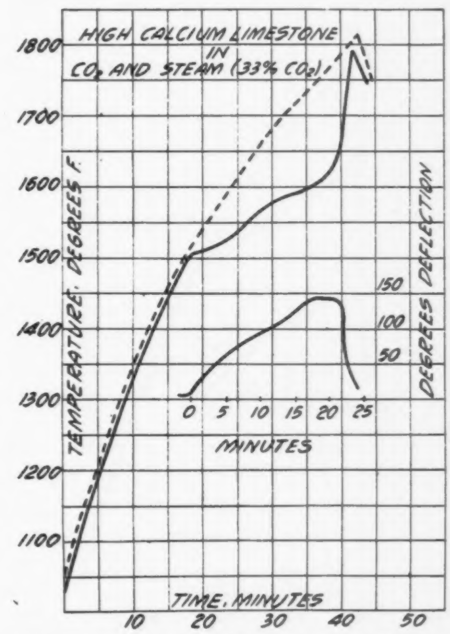


Fig. 3. Decomposition curve of high calcium limestone burned in atmosphere of steam containing 33% CO_2

phere of steam containing 33% CO_2. There is very little difference between steam and air atmosphere. The initial decomposition point is the same, 1500 deg., proving that presence of steam does not help to lower decomposition temperature; that steam acts the same as any other gas and if there is any difference it must be due to lower density, lower viscosity, greater penetration into the specimen and consequent reduction in CO_2 tension in the inner regions, but this penetration can be only for slight distances and so does not enter into the problem of practical lime burning to any perceptible extent. It is unnatural to expect that when there is a rather great outflow of gas there could be any considerable inflow at the same time.

Fig. 4 by way of comparison shows the

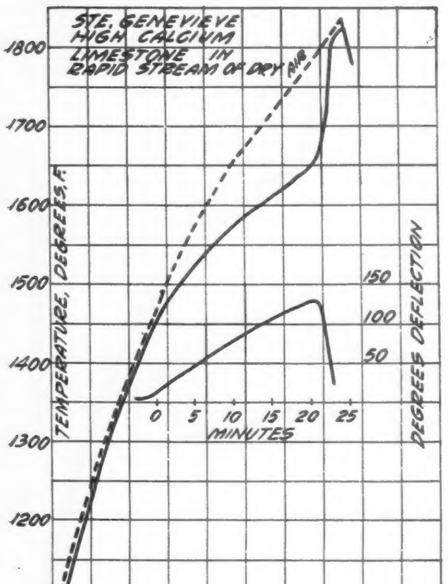


Fig. 4. Decomposition curve of high calcium limestone burned in rapid stream of dry air

point of limestone initial decomposition in an atmosphere of air not containing CO_2 nor steam. The initial point of breaking down is at 1450 deg. F, 200 deg. below the point in 100% CO_2 and 50 deg. F. below the 33% CO_2 or steam in the atmosphere. The same slope is noticeable, only naturally more pronounced, due to greater difference in concentration outside and inside of the specimen.

The next series of charts are based on identical experiments using magnesian limestone in place of the high calcium stone. This stone in 100% CO_2 atmospheric, as

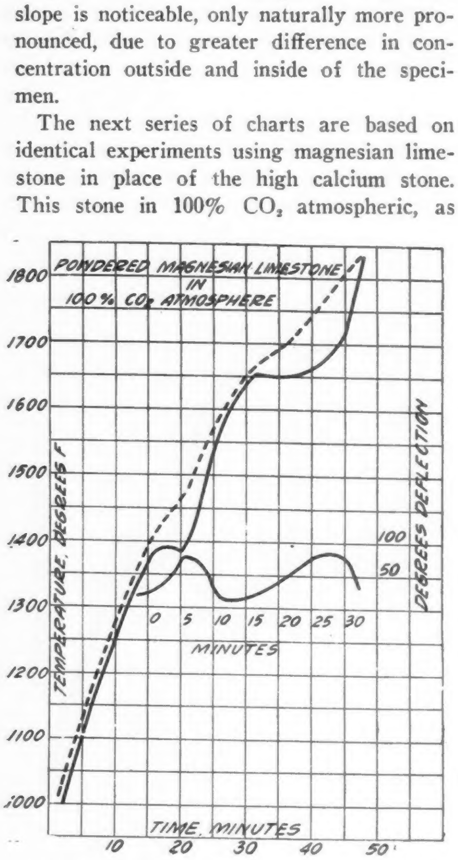


Fig. 5. Decomposition curve of magnesian limestone burned in 100% CO_2 atmosphere

shown in Fig. 5, has two decomposition points—one at 1370 deg. F. when CO_2 is driven off from $MgCO_3$ and the other at 1650 deg. F. when CO_2 is separated from $CaCO_3$. Since the decomposition temperature of $MgCO_3$ when free is considerably below 1370 deg. F., the higher point in this instance demonstrates that the magnesium and calcium carbonates are here in some kind of a combination.

Fig. 6 gives decomposition points of magnesian limestone in 33% CO_2 and air atmosphere. Decomposition begins at 1360 deg. and calcium carbonate decomposition is at 1580 deg. F.

Fig. 7 is identical with Fig. 6 except that the atmosphere is 33% CO_2 and steam instead of air. $MgCO_3$ decomposes again at 1560 deg., proving the conclusions made previously with high calcium limestone.

The theory that limestone burning in pres-

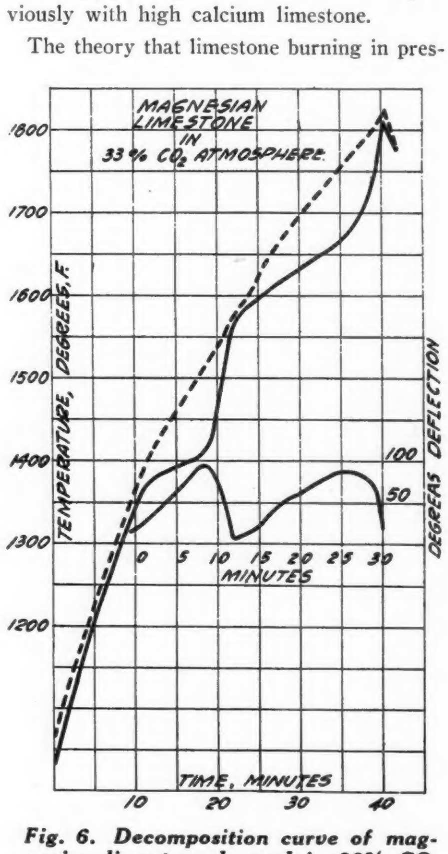


Fig. 6. Decomposition curve of magnesian limestone burned in 33% CO_2 atmosphere

ence of steam will be first converted to the hydrate and later to the oxide is not tenable since the hydrate decomposes to oxide much below the carbonate decomposition point. A hydrate cannot exist at the high temperatures at which decomposition goes on. Fig. 8 shows the decomposition point of calcium hydrate in both an atmosphere of air and also of steam. In the first case the breaking down begins at 830 deg. and is complete at about 950 deg. F., and in the second case it begins at 980 deg. F. and it is completed at only slightly above that figure.

If calcium hydrate is heated in an atmosphere of CO_2, the deflection of the curve due to breaking down is hardly noticeable since the heat absorbing process is neutral-

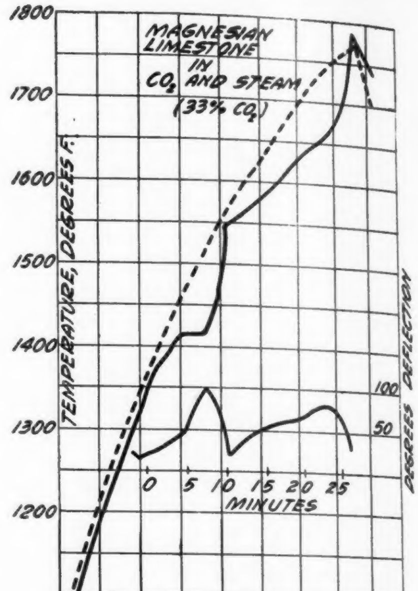


Fig. 7. Decomposition curve of magnesian limestone burned in atmosphere of steam containing 33% CO_2

ized by the immediate conversion of the newly formed and activated calcium oxide into calcium carbonate. All of this supports the conclusion that it is impossible for the hydrate to exist or form at the higher temperatures. Further, the reaction: $CaCO_3 + H_2O = CaO + CO_2 + H_2O$ is so indirect that it is hardly possible to conceive how it could occur in preference to the reaction: $CaCO_3 = CaO + CO_2$.

If steam assisted decomposition, kilns fired with wood should have a high thermal efficiency; actually and on the contrary they are the most inefficient. For every pound of wood burnt in the kiln, about 0.8 lb. of water passes into the kiln at the same time. This water is from free moisture in the wood, that formed by the combination of the oxygen and its portion of hydrogen and the moisture resulting from combustion of remaining hydrogen. Since steam has a high specific heat and a rather high latent heat of evaporation, 62% of the heat entering a wood fired lime kiln is not available for lime

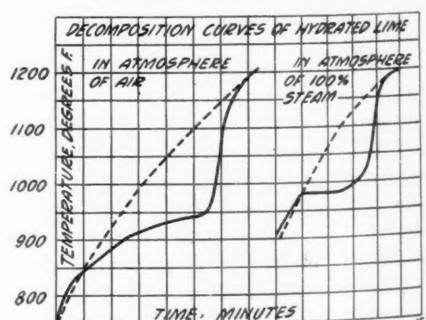


Fig. 8. Decomposition curves of hydrated lime burned in atmospheres of air and of steam

making due to its low level in temperature elevation. In a coal burning kiln the heat unavailable for lime burning is only 32%, this great difference being entirely due to the fact that the water and oxygen content of coal is comparatively low.

It is true that lime from wood burned kilns is in some ways superior to lime from coal fired kilns, but the reason for this cannot be attributed to steam directly, but rather to the low temperatures at which the lime has to be burned due to the diluting effect of steam. The lime is better but entirely at the expense of the wood pile. The same kind of lime could be made with coal under the same wasteful conditions by the injection of the same amount of steam from outside sources.

Use of Steam Sometimes Justified

In some cases steam is justified as, for example, in prevention of clinkering of gas producers, but while steam is helpful there it will cause harm when it gets into the lime kiln. The portion that passed through the producer without breaking down will serve merely as a carrier of heat from the zone where lime is made into the zone where it is not made; in other words, it will merely waste heat. The portion that breaks down will be doubly harmful, for the hydrogen thus formed burns with a very short flame, causing high local temperatures.

The amount of steam decomposed while passing through the fuel bed depends to a greater extent on the time of contact. In a very thick bed in a gas producer almost all may be broken down, but in thinner beds the amount of steam decomposed may be only 50% or even less. Accordingly, the amount of steam decomposed on a direct fired grate due to comparatively high velocity and very thin beds would be quite small, so the only effect the steam would have in the furnace and kiln would be that of dilution, lowering of temperatures and wasting of fuel. If the steam would break down the resulting hydrogen would burn almost immediately, the air would come in contact with it, causing higher furnace temperatures but lower kiln temperature because of the dilution ecects of water vapor; so actually it is fortunate that decomposition of steam is not greater in a direct fired bed.

There is no doubt that clinkering is greatly reduced by the use of steam even on a direct fired grate. The action, however, may be more due to particles of water than steam. For this purpose steam is quite beneficial. If furnace and kiln temperatures are to be lowered, the use of kiln gas itself is by far to be preferred since it costs little, while steam generation as conducted in the ordinary lime plant is wasteful and expensive.

Summarizing, it may be said that steam made in the lime kiln invariably wastes fuel and does not help decomposition. Under certain conditions steam may cause very high local temperatures, but it also tends to reduce the average kiln temperatures. It may give softer burned lime but at the expense of the coal or wood pile. Professor Haslam is of the belief that steam probably tends to break down the hydro-carbons, the most useful components of fuel from the lime-burning standpoint by which a shortening of the desired long, mild luminous flame may result. Practically everywhere where steam has to be used the substitution of kiln gas containing CO_2* is to be preferred.

Water Purification and Softening on Program of American Chemical Society

WATER PURIFICATION and softening will be discussed by C. P. Hoover, a recognized authority and consultant on that subject, before the Industrial Division of the American Chemical Society at its meeting in Richmond, Va., April 11 to 16, when three half days will be devoted to a Symposium on Lime. In the process industries the quality of the water may be a determining factor in success or failure, and results of extensive tests in connection with many of the more important specific problems such as split treatment sterilization with lime, recarbonation, automatic chemical dosage through pH control, and the adaptation of mechanical equipment, will be presented and their relation to industrial and domestic problems discussed.

Hard water is one of the most disagreeable and expensive industrial and household commodities, and its cost and inconvenience are just beginning to attract the consideration they deserve. The yearly losses caused by hard water in increased plumbing costs, heat inefficiency due to boiler scale, soap costs, deterioration of fabrics, inferiority of products and the loss of chemicals in the process industries are considered of real economic importance. A few facts only are needed to call attention to these needless wastes.

In the case of a typical city of intermediate size it is estimated that it would cost $150 a day to soften the water, whereas the saving in soap alone would amount to $500 a day, to say nothing of the comfort and convenience from soft water. A recent report of a survey by railway water service engineers showed that the savings resulting from softening of the locomotive water supplies on a number of roads ranged from $1500 to $8000 for each locomotive a year. The savings in power plants and industrial plants are of the same order.

Papers describing a large number of other investigations of problems of lime manufacture and use will be presented during the symposium. Prof. J. R. Withrow, head of the department of chemical engineering of Ohio State University, is in charge of the program.

*See "Use of Steam in Gas Producers as Compared with Waste Gas Containing CO_2," V. J. Azbe, ROCK PRODUCTS, November 27, 1926.

Chemical Society to Hear About Lime and Lime Kilns

LIME PRODUCERS will be interested in hearing Richard K. Meade, one of the pioneers in kiln design, and recognized as an authority on the subject, discuss kiln design at the lime symposium, three half-day sessions at the spring meeting of the American Chemical Society, Richmond, Va., April 11-16.

The papers on lime-kiln fuel efficiencies by Victor J. Azbe; lime hydration, by Adams; and lime research, by Haslam, will also be of exceptional interest to both lime producers and chemists who make use of lime in their processes and industries.

Prof. G. I. McLaughlin of the University of Cincinnati will present a paper on the use of lime in the leather industries.

Although the leather industry is one of the oldest, developments have come slowly, but recent years have been a tremendous advance in scientific knowledge and control. These advances will be discussed at this lime symposium, as well as subjects of allied interest to leather manufacturers and technologists, such as the slaking of lime, water softening, and the treatment of trade wastes.

Prof. J. R. Withrow, head of the chemical engineering department, Ohio State University, is in charge of the preparation of the symposium and will preside during the sessions.

The program includes several papers of particular interest to the steel industry. The outstanding paper is one on the open-hearth practice of utilizing quicklime for fluxing, to be presented by Dr. D. H. Herty, Jr., of the Pittsburgh Station of the Bureau of Mines, who will describe his extensive investigations in open-hearth refining.

This is at present being done in some parts of the country (among others, in the Birmingham district), and work indicates that substantial benefits may be realized by this practice. This is a timely topic, and the discussion of the economics of limestone and quicklime fluxing should be enlightening.

British Increase Production of Quick-Hardening Cement

THE portland cement industry in Great Britain is progressing along the lines of making ordinary cement in rapid-hardening forms by careful attention to proportioning raw materials and fine grndng, says the *Journal of the Society of Chemical Industry.* Such rapid-hardening cements compete successfully with the French aluminous cements which are offered at prices considerably above portland cement. The great need, however, in the British cement industry is a more practical interest in cement research.

Hints and Helps for Superintendents

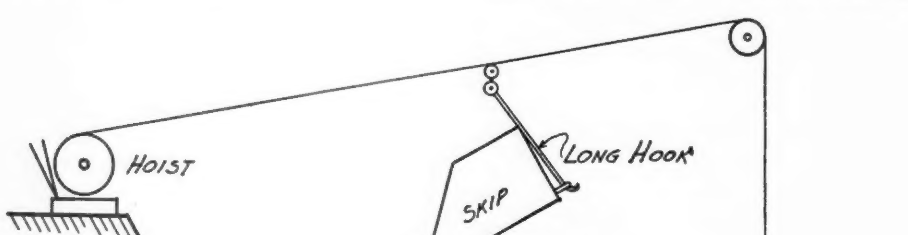

Side and rear view of the skips used in the car dumping system. Note the loops at the back of the cars

Novel System of Car Dumping

ONE of the novel features about the plant of the Edison Portland Cement Co., New Village, N. J., is the system of car dumping which is the invention of Thomas A. Edison. The quarry cars used at this operation are only flat trucks on which rest the skips adapted to this dumping system. The skips resemble large flat-bottomed scoops with a loop at the back where a scoop handle would be.

When the car is to be dumped at the plant a man places a long hook, attached to a hoisting rope, in this loop. The pull of the hoists first draws the skip forward on the car and then pours its contents into the hopper of the Edison rolls which are the primary crusher. When the hoist is released a weight on the other end of the rope pulls the skip back on the car. The weight strikes the ground at the end of its run, slackening the rope so that the hook may be removed from the loop. It is a simple and ingenious device and is said to have given very good service at the plant.

A device quite similar in operation, using the same type of quarry cars, has been in use at the Tomkins Cove Stone Co. plant at Tomkins Cove, N. Y. The primary crusher at this plant was also an Edison giant roll.



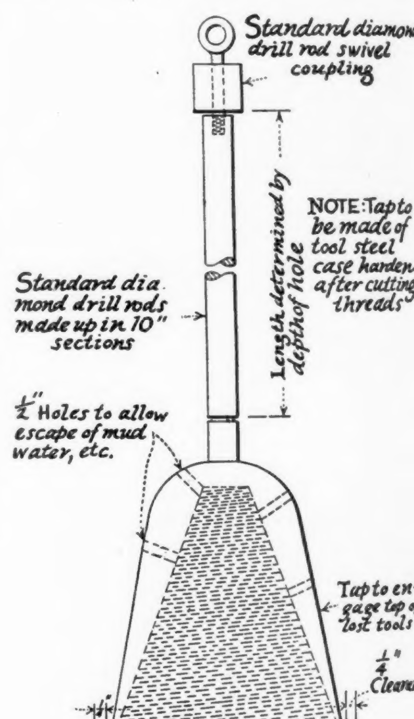
Illustrating the method by which cars are dumped at the crusher opening

Device for Recovering Well-Drill Tools

A FAIRLY frequent mishap in well-drilling is the loosening or breaking off of the drill tools at the joints and the consequent falling back of the tool into the hole while the drill is in operation. Recovery of the lost section is usually through "fishing," at the best a tedious and not always successful expedient.

In a recent issue of *Engineering and Mining Journal* there appeared a description and illustration of a device by R. H. Poston which was used in recovering a string of tools in a Missouri mine. Since the drilling conditions in the rock products industry are quite similar, we are reproducing the article as an aid to any producers who may have such difficulties.

The particular string of tools in ques-



Device for quick retrieving of well-drill tools dropped in hole

tion, weighing 1468 lb., together with 60 ft. of 2¼-in. manila rope, broke off the main cable while drilling and fell to the bottom of a 225-ft. hole. The force of the fall

caused the top of the tools to become embedded in the side of the wall, and this position further complicated their recovery.

Some ten days were consumed in cutting and removing the rope and in trying to get over the end of the tools with standard well-drill fishing tools. A tap, constructed as shown in the accompanying sketch and used in conjunction with standard diamond-drill rods, finally accomplished the desired result, and the lost tools were retrieved in an hour and forty minutes after the special tap was lowered into the hole.

In operation the tap was fastened to the diamond-drill rods and lowered into the hole by the addition of other rods until the tap rested on the upper end of the well-drill tools. Hand pipe wrenches were then employed to turn the rods, until the tap threads began to engage the top of the rope socket. Additional leverage, by means of pipes over the end of the wrench handles, forced the tap to take firm hold of the rope socket. When this had been accomplished it was only necessary to connect the diamond-drill rod swivel to the sand line and pull the tools loose and out of the hole.

Old Kiln as Scrubber for Limestone

THE limestone deposit and crushing operation of the Southern Minerals Co., at Winnfeld, La., has been described in previous issues of ROCK PRODUCTS. It is one of very few limestone deposits in the lower Mississippi valley, anywhere near the river. The limestone deposit is on top of a salt dome, evidently pushed through the surface in by-gone ages by some expansive force; consequently it is badly broken up and the fissures have become filled with silt and loam from the surface.

All the stone has to be washed. The original washing operation using log washers was described in detail in ROCK PRODUCTS, June 26, 1926, pp. 47-48. Subsequently an old 6x60-ft. rotary kiln was purchased and installed as illustrated herewith. The first two 20-ft. sections of the kiln act as a scrubber, having angle-irons riveted to the shell as lifters or vanes. The last 20-ft. has ¾-in. holes drilled through the shell to dewater the stone. To save the fine stone a wire-mesh jacket has been added, with ¼-in. openings. The scrubber and the screen jacket discharge to a wood chute leading to the screening and recrushing plant.

This rotary scrubber-washer is fed with all the material going through the primary crusher—a No. 9 Gates gyratory. The results obtained have amply justified the installation, which undoubtedly is the largest scrubber-washer in the crushed stone industry.

I. L. Lyons, New Orleans, La., is president of the Southern Minerals Co., and J. M. Jenkins is superintendent at Winnfield.

View of quarry No. 1, Southern Minerals Co., Winnfield, La., showing stripped area

Excavations at quarry No. 4. Note the large amounts of loam which made good washing necessary

Revamped 60-ft. rotary kiln which serves as efficient scrubber. The view shows the discharge dropping on return belt to the recrushing plant

Financial News and Comment

RECENT QUOTATIONS ON SECURITIES IN ROCK PRODUCTS CORPORATIONS

(These are the most recent quotations available at this printing. Revisions, corrections and supplemental information will be welcomed by the editor.)

Stock	Date	Par	Price bid	Price asked	Dividend rate
Allentown Portland Cement Co. (common)[32]	Mar. 25	....	2	4	
Allentown Portland Cement Co. (6% bonds, 1932)[32]	Mar. 25	....	86	....	
Alpha Portland Cement Co. (common)[2] new stock	Mar. 24	No par	38	40	75c Jan. 15
Alpha Portland Cement Co. (preferred)[2]	Mar. 24	100	115	....	1¾% quar. Mar. 1
American Lime and Stone Co. (7% bonds, 1942)[32]	Mar. 14	....	98	101	
Arundel Corporation (sand and gravel—new stock)	Mar. 29	No par	34	34¾	50c April 1
Atlantic Gypsum Products Corp. (1st 6's carrying 10 sh. com.)[10]	Mar. 30	....	112	114	
Atlas Portland Cement Co. (common)[2]	Mar. 29	No par	42⅛	42¼	50c qu. March 1
Atlas Portland Cement Co. (preferred)	....	100	....	....	2% quar. Oct. 1
Atlas Portland Cement Co. (preferred)[2]	Mar. 28	33⅓	43	....	2% quar. Jan. 3
Beaver Portland Cement Co. (1st Mort. 7's)[8]	July 29	100	100	100	
Bessemer Limestone and Cement Co. (Class A)[4]	Mar. 28	....	34½	34¾	
Bessemer Limestone and Cement Co. (6½% bonds)[4]	Mar. 28	....	98¼	99½	
Boston Sand and Gravel Co. (common)	Mar. 25	100	70	....	1% qu., 2% ex. Jan. 1
Boston Sand and Gravel Co. (preferred)	Mar. 25	....	....	85	1¾% quar. Jan. 1
Boston Sand and Gravel Co. (1st preferred)	Mar. 25	....	....	90	2% quar. Jan. 1
Canada Cement Co., Ltd. (common)	Mar. 29	100	137¾	138	1¾% April 16
Canada Cement Co., Ltd. (preferred)[11]	Mar. 25	100	117	118½	1¾% quar. Feb. 16
Canada Cement Co., Ltd. (1st 6's, 1929)[11]	Mar. 25	....	101	102	3% semi-annual A&O
Canada Crushed Stone Corp., Ltd. (6½s, 1944)[11]	Mar. 25	100	93	96	
Charles Warner Co. (lime, crushed stone, sand and gravel)	Mar. 26	No par	23	25	75c Jan. 12
Charles Warner Co. (preferred)	Mar. 26	100	100	104	1¾% quar. Jan. 27
Charles Warner Co. (lime, crushed stone, sand and gravel) 7s, 1929[16]	Mar. 25	100	102	103½	
Cleveland Stone Co. (new stock)	Mar. 30	....	50	50	50c qu. June 15
Connecticut Quarries Co. (1st Mortgage 7% bonds)[17]	Mar. 25	100	104	....	
Consolidated Cement Corp. (1st Mort., 6½s, series A)[24]	Mar. 30	100	97	99	
Consolidated Cement Corp. (5 yr. 6½% gold notes)[24]	Mar. 30	100	96	100	
Consumers Rock and Gravel Co. (1st Mort. 7s)[18]	Mar. 24	100	99½	101½	
Coosa Portland Cement Co. (6% bonds, 1944)[32]	Mar. 25	....	65	....	
Coplay Portland Cement Co. (6% bonds, 1941)[32]	Mar. 25	....	88	....	
Dewey Portland Cement Co. (1st mort. 6's 1942)[30]	Mar. 30	100	98½	100	
Dolese and Shepard Co. (crushed stone)[7]	Mar. 29	50	94	98	$1.50 Jan. 1, $1.50 ex. Jan. 1
Egyptian Portland Cement Co. 7% pfd.[21]	Mar. 24	....	90	100	1¾% quar. Oct. 1
Egyptian Portland Cement Co. (common)[21]	Mar. 24	....	7	8½	40c quar. Oct. 1
Fredonia Portland Cement Co. (6½% bonds, 1940)[32]	Mar. 25	....	97	101	
Giant Portland Cement Co. (common)[2]	Mar. 29	50	64	64	
Giant Portland Cement Co. (preferred)[25]	Mar. 28	50	42	47	3½% and 19% ex. Dec. 15
Ideal Cement Co. (common)	Mar. 29	No par	85	87	$1 quar., $1 ex. Dec. 15
Ideal Cement Co. (preferred)[33]	Mar. 28	100	111	112½	1¾% quar. Dec. 15
International Cement Corporation (common)	Mar. 29	No par	50¾	51	$1 quar. Mar. 31
International Cement Corporation (preferred)[2]	Mar. 28	100	107¾	107¾	1¾% quar. Mar. 31
Kelley Island Lime and Transport Co.	Mar. 30	100	135	135	$2 quar. April 1
Lawrence Portland Cement Co.[3]	Mar. 25	100	95	100	2% quar.
Lehigh Portland Cement Co.[6]	Mar. 28	50	90	93	1½% quar.
Lyman Richey Sand and Gravel Co. (1st Mort. 6s, 1928 to 1931)[13]	Mar. 26	100	99	100	
Lyman Richey Sand and Gravel Co. (1st Mort. 6s, 1932 to 1935)[13]	Mar. 26	100	97	99	
Marblehead Lime Co. (1st Mort. 7's)[14]	Mar. 26	100	100	....	
Marblehead Lime Co. (5½% notes)[14]	Mar. 26	100	98	....	
Michigan Limestone and Chemical Co. (common)[6]	Mar. 28	....	26	28	
Michigan Limestone and Chemical Co. (preferred)[6]	Mar. 28	....	24	26	1¾% quar. July 15
Missouri Portland Cement Co.	Mar. 29	25	49	49	50c Feb. 1
Monolith Portland Cement Co. (common)[9]	Mar. 24	....	12⅜	12¾	8% ann. Jan. 2
Monolith Portland Cement Co. (units)[9]	Mar. 24	....	31⅛	32¼	
Monolith Portland Cement Co. (preferred)[9]	Mar. 24	....	9⅜	9¾	
National Gypsum Co. (common)[35]	Mar. 30	....	36	36¾	
National Gypsum Co. (preferred)[35]	Mar. 30	....	71	73	
Nazareth Cement Co.[20]	Mar. 25	No par	28	31	75c quar. Apr. 1
Newaygo Portland Cement Co.[1]	Mar. 29	....	111	115	
Newaygo Portland Cement Co. (6½% bonds, 1938)[32]	Mar. 25	....	99	102	
New England Lime Co. (Series A, preferred)[14]	Mar. 26	100	....	95	
New England Lime Co. (Series B, preferred)[23]	Mar. 25	100	95	97	
New England Lime Co. (V.T.C.)[22]	Mar. 25	....	34	36	
New England Lime Co. (6s, 1935)[14]	Mar. 26	100	99	101	
New York Trap Rock Corp. (6% bonds, 1946)[32]	Mar. 25	....	95	100	
North American Cement Corp. 6½s 1940 (with warrants)	Mar. 28	100	90¼	90½	
North American Cement Corp. (units of 1 sh. pfd. plus ½ sh. common)[32]	Mar. 25	....	70	80	2 mo. period at rate of 7%
North American Cement Corp. (common)[19]	Nov. 8	....	20	22	
North American Cement Corp. (preferred)	Jan. 28	....	....	....	1.75 quar. Feb. 1
North Shore Material Co. (1st Mort. 6's)[15]	Mar. 28	100	98½	100	
Pacific Portland Cement Co., Consolidated[5]	Mar. 26	100	62	....	25c mo.
Pacific Portland Cement Co., Consolidated (secured serial gold notes)[5]	Mar. 26	100	98⅜	....	3% semi-annual Oct. 15
Peerless Portland Cement Co.[1]	Mar. 29	10	4⅞	5¼	
Pennsylvania-Dixie Cement Corp. (1st Mort. 6's)[29]	Mar. 29	100	100½	100½	
Pennsylvania-Dixie Cement Corp. (preferred)[28]	Mar. 29	100	99¾	99¾	1¾% March 15
Pennsylvania-Dixie Cement Corp. (common)[28]	Mar. 29	....	34¾	35	80c April 1
Petoskey Portland Cement Co.[1]	Mar. 29	10	9½	10	1½% quar.
Pittsfield Lime and Stone Co.[31]	Feb. 25	....	....	100	
Pittsfield Lime and Stone Co.[31] (common)	Feb. 25	....	....	25	

(CONTINUED ON PAGE 70)

[1]Quotations by Watling, Lerchen & Hayes Co., Detroit, Mich. [2]Quotations by Bristol & Willett, New York. [3]Quotations by True, Webber & Co., Chicago. [4]Quotations by Butler, Beading & Co., Youngstown, Ohio. [5]Quotations by Freeman, Smith & Camp Co., San Francisco, Calif. [6]Quotations by Frederic H. Hatch & Co., New York. [7]Quotations by F. M. Zeiler & Co., Chicago, Ill. [8]Quotations by Ralph Schneeloch Co., Portland, Ore. [9]Quotations by A. E. White Co., San Francisco, Calif. [10]Quotations by Lee, Higginson & Co., Boston and Chicago. [11]Nesbitt, Thomson & Co., Montreal, Canada. [12]E. B. Merritt & Co., Inc., Bridgeport, Conn. [13]Peters Trust Co., Omaha, Neb. [14]Second Ward Securities Co., Milwaukee, Wis. [15]Central Trust Co. of Illinois, Chicago. [16]J. S. Wilson Jr. Co., Baltimore, Md. [17]Chas. W. Scranton & Co., New Haven, Conn. [18]Dean, Witter & Co., Los Angeles, Calif. [19]Hemphill, Noyes & Co., New York. [20]Quotations by Bond & Goodwin & Tucker, Inc., San Francisco. [21]Baker, Simonds & Co., Inc., New York. [22]William C. Simons, Inc., Springfield, Mass. [23]Blair & Co., New York and Chicago. [24]A. B. Leach and Co., Inc., Chicago. [25]A. C. Richards & Co., Philadelphia, Penn. [26]Hincks Bros. & Co., Bridgeport, Conn. [27]J. G. White and Co., New York. [28]Mitchell-Hutchins Co., Chicago, Ill. [29]National City Co., Chicago, Ill. [30]Chicago Trust Co., Chicago. [31]McIntyre & Co., New York, N. Y. [32]Hepburn & Co., New York. [33]Boettcher & Co., Denver, Colo. [34]Kidder, Peabody & Co., Boston, Mass. [35]Farnum, Winter and Co., Chicago.

Editorial Comment

Future of the South

To those who have the opportunity to visit our Southern States at more or less regular intervals the growth and development of this section is astonishing. We do not have in mind the Florida and Gulf Coast resort boom, but the rapid and steady growth of industry, the construction of public works and public buildings. Probably no section of the world today offers greater opportunities for the production of future wealth. In the Chattanooga district alone, the United States Geological Survey, from extensive study and investigation, estimates iron ore deposits in excess of one billion tons. Also there are coal and limestone deposits. There are extensive iron ore and coal deposits in western Tennessee and Alabama, and important iron ore deposits in Texas and southeastern Missouri.

A steel country is a rich country, because nearly all other industries group themselves about blast furnaces —as witness the great manufacturing industries of Pennsylvania and Ohio. It may be, as many believe, that the immediate future of industrial development of the South and the demands it will make upon producers of building materials, such as portland cement, has already been pretty well discounted; and that production and prospective production of these commodities is away in excess of any present expectation of demand; but we do have some real sympathy for the citizens of the South who are filled with optimism on the future of that section of the country.

Scientific Lime-Kiln Operation

We think William H. Barton of the Blue Diamond Co., Los Angeles, whose article appears in this issue, would readily admit that he still has much to learn about the control of lime burning —scientific control we prefer to call it; but by that term we *do not* imply the impracticability that many lime manufacturers are very much inclined to associate with "scientific lime manufacture." So pronounced is this prejudice among the rank and file of lime-plant employes that in this case, not only as part of the experiment but to safeguard successful fruition, it was desirable, if not absolutely necessary, to employ men whose distinction was a *lack of knowledge* of lime burning.

The first step in the scientific control of lime burning is to know what is happening in a lime kiln "under fire." Mr. Barton is, so far as we know, the first to be able to discover ways and means of knowing this. His findings have not always been in accord with previous theory; but an industry never has progressed from mere theorizing. For example he discovered something that we can hardly account for by theory—that under certain kiln conditions free hydrogen may be found in the kiln exhaust gases.

In cutting down the air (or oxygen) supply to approximately the theoretical amount required for perfect combustion, with no excess whatsoever, a condition is reached, apparently, where some of the hydrogen formed in the breaking up of the fuel is so diffused in an atmosphere composed almost entirely of CO_2 gas and nitrogen, that it has no opportunity to combine again with the oxygen, also highly diffused in minute quantities, to form steam, or water vapor.

It is hard to explain in theory free hydrogen and free oxygen, even in very small amounts, at temperatures of 1800 deg. F. or more. But proof is more convincing than theory, just as experiment is more progressive than theory.

Another good example of experiment vs. theory is Victor J. Azbe's work on the effect of steam in lime burning. His conclusions are quite upsetting to some long-held opinions in regard to lime manufacture. Nevertheless we can't safely dispute scientific facts, established by carefully and accurately made experiments. Mr. Azbe has been a lone worker in his field of the study of combustion problems in lime burning.

Coal Miners' Strike

By the time this issue of Rock Products reaches its readers a strike of the union coal miners in the Central West bituminous fields, from western Pennsylvania to Iowa, will doubtless be in full swing. Up to this writing—March 31—the situation has been accepted by American industry with remarkable equanimity and philosophy. Even news of the coming strike is relegated to the back pages of the newspapers. Nevertheless, if the strike lasts as long as some well-informed coal operators believe it will, manufacturers in all lines, particularly portland cement and lime producers, are pretty certain to be subjected to hardships and cost increases at a time when they can ill-afford to have them. Also, judging by past experience, it is going to be difficult to avoid transportation jams which will create havoc with the movement of stone, sand and gravel.

There is undoubtedly enough coal mined and stored to last industries for a few months, and the non-union fields will continue to produce; but unless the duration of the strike is comparatively brief, the situation for rock products producers is not pleasing, and every effort should be made to move sand, gravel and stone early, before the demand for open-top cars for coal becomes insistent, as it most certainly will later on in the season.

RECENT QUOTATIONS ON SECURITIES IN ROCK PRODUCTS CORPORATIONS (Continued)

Stock	Date	Par	Price Bid	Price Asked	Dividend Rate
Rockland and Rockport Lime Corp. (1st preferred)[34]	Mar. 25	100	103	....	3½% semi-annual Feb. 1
Rockland and Rockport Lime Corp. (2nd preferred)[34]	Mar. 25	100	60	....	3% semi-annual Feb. 1
Rockland and Rockport Lime Corp. (common)[34]	Mar. 25	No par	50	55	1½% quar. Nov. 2
Sandusky Cement Co. (common)[1]	Mar. 30	100	125	135	$2 qu. April 1
Santa Cruz Portland Cement Co. (bonds)[5]	Mar. 11	....	....	105¾	6% annual
Santa Cruz Portland Cement Co. (common)[5]	Mar. 26	....	85	100	$1 quar., $1 ex. Jan. 1
Schumacher Wallboard Corp. (common)	Mar. 26	....	27¼	27¾	
Schumacher Wallboard Corp. (preferred)	Mar. 26	....	27¾	....	
Superior Portland Cement, Inc. (Class A)[20]	Mar. 24	....	43	43½	
Superior Portland Cement, Inc. (Class B)[20]	Mar. 24	....	20½	21	
United Fuel and Supply Co. (sand and gravel) 1st Mort. 6s[27]	Mar. 25	100	98	100	
United Fuel and Supply Co. (sand and gravel) 6% gold notes[27]	Mar. 25	100	98	100	
United States Gypsum Co. (common)	Mar. 29	20	96⅝	97	40c quar. March 31
United States Gypsum Co. (preferred)	Mar. 29	100	117½	....	1¾% quar. March 31
Universal Gypsum Co. (common)[3]	Mar. 29	No par	6½	7	
Universal Gypsum V.T.C.[3]	Mar. 30	No par	5¾	6	
Universal Gypsum Co. (preferred)[3]	Nov. 23	....	73	77	1½% Feb. 15
Universal Gypsum and Lime Co. (1st 6's, 1946)[3]	Mar. 30	100	....	96	
Union Rock Co. (7% serial gold bonds)[18]	Mar. 24	100	99	101	
Upper Hudson Stone Co. (1st 6's, 1951)[32]	Mar. 25	....	94	....	
Upper Hudson Stone Co. (1st 6's, 1937)[32]	Mar. 25	....	94	....	
Vulcanite Portland Cement Co. (7½% bonds, 1943)[32]	Mar. 25	....	105	....	
Wisconsin Lime and Cement Co. (1st Mort. 6s, 1940)[15]	Mar. 30	100	98½	100	
Wolverine Portland Cement Co.	Mar. 29	10	5¼	6	1½% Feb. 15

QUOTATIONS OF INACTIVE ROCK PRODUCTS SECURITIES

Stock	Date	Par	Price bid	Price asked	Dividend rate
Atlanta Shope Brick and Tile Co.[1]	Nov. 24	....	25c	....	
Benedict Stone Corp. (cast-stone) (50 sh. pfd. and 390 sh. com.)[1]	Dec. 29	....	$400 for the lot	....	
Blue Stone Quarry (60 shares)[2]	Mar. 16	....	$10¼ for the lot	....	
Coplay Cement Mfg. Co. (common) (4)	Dec. 16	....	12½	....	
Coplay Cement Mfg. Co. (preferred) (1)	Dec. 30	....	70	....	
Eastern Brick Corp. 7% cu. pfd.) (1)	Dec. 9	10	40c	....	
Eastern Brick Corp. (sand lime brick) (common) (1)	Dec. 9	10	40c	....	
Edison Portland Cement Co. (common)[4]	Sept. 11	50	20c	....	
Edison Portland Cement Co. (preferred)	Nov. 3	50	17½c(x)	....	
International Portland Cement Co., Ltd. (preferred)	Mar. 1	....	30	45	
Globe Phospate Co. ($10,000 1st mtg. bonds, $169.80 per $1000 paid on prin.)	Dec. 22	....	$50 for the lot	....	
Iroquois Sand & Gravel Co., Ltd. (2 sh. com. and 3 sh. pfd.) (1)	Mar. 17	....	$12 for the lot	....	
Limestone Products Corp. (150 sh. pfd., $50 par, and 150 sh. com., no par)	Dec. 22	....	$60 for the lot	....	
Missouri Portland Cement Co. (serial bonds)	Dec. 31	....	104¾	104¾	3¼% semi-annual
Olympic Portland Cement Co. (g)	Oct. 13	....	....	£1⅝	
Phosphate Mining Co. (1)	Nov. 24	....	1	....	
River Feldspar and Milling Co. (50 sh. com. and 50 sh. pfd.) (1)	June 23	....	$200 for the lot		
Rockport Granite Co. (1st 6's, 1934)[2]	Aug. 31	....	90	....	
Simbroco Stone Co. (pfd.)	Dec. 12	....	....	....	$2 Jan. 1
Southern Phosphate Corp.[6]	Sept. 15	....	1¼	....	
Tidewater Portland Cement Co. (3000 sh. com.)	Dec. 22	....	$6525 for the lot	....	
Vermont Milling Products Co. (slate granules) 22 sh. com. and 12 sh. pfd. (6)	Nov. 3	....	$1 for the lot	....	
Wabash Portland Cement Co.[1]	Aug. 3	50	60	100	
Winchester Brick Co. (preferred) (sand lime brick) (5)	Dec. 16	....	10c	....	

(g) Neidecker and Co., Ltd., London, England. (1) Price obtained at auction by Adrian H. Muller & Sons, New York. (2) Price obtained at auction by R. L. Day and Co., Boston. (3) Price obtained at auction by Weilepp-Bruton and Co., Baltimore, Md. (4) Price obtained at auction by Barnes and Lofland, Philadelphia, Pa. (5) Price obtained at auction for lot of 50 shares by R. L. Day and Co., Boston, Mass. (x) Price obtained at auction by Barnes and Lofland, Philadelphia, on November 3, 1925. (6) Price obtained at auction by Wise, Hobbs and Arnold, Boston, Mass.

Canada Cement Company's History

(By a Special Correspondent)

THE Canada Cement Co. was incorporated in August, 1909, as a merger of twelve companies engaged in the production of portland cement in western and eastern Canada, thus achieving, with the exception of one or two smaller companies, a virtual monopoly of the cement business of the Dominion. The company now controls 15 mills situated in Quebec, Ontario, Alberta and Manitoba; in addition it is understood that it holds securities of United States cement producers. The company's investment account is made up of the securities of many companies, one of the largest of which is the Consumers' Glass Co., a leading glass manufacturer in the Dominion which is controlled by Canada Cement. It also controls gypsum mines and several other projects.

While the stock is fairly widely held, it appears to be held largely only by those who are not looking for any immediate profit, but who are looking two or three years hence to the time when the excellent earnings of the company must eventually be more largely distributed to the shareholders.

Long ago the stock reached the position where it was regarded as a sound investment. By the accumulation of surplus earnings which have yearly been ploughed back into the property, all the "slack" capital in the original merger has been entirely eliminated. The earnings shown on the profit and loss account are not nearly as spectacular as are sometimes imagined, for it has been the management's policy to build up the financial structure rather than to endeavor to build up the market position of the shares. The result has been that the record of the stock has been impressive also.

At the annual meeting of Canada Cement Co., Ltd., in March, 1918, the late Senator W. C. Edwards, then president of the enterprise, made an important announcement. It was a statement regarded by shareholders at that time as an epochal one in the progress of the company. It was to the effect that the "water" had been squeezed out of Canada Cement common. Senator Edwards stated to the shareholders that he had always looked forward to the time when he could make the statement that there was not a drop of water in the common stock. As a result of the excellent business of 1917 he was able to make that statement. Just how important an announcement that was could best be realized by conservative students of financial affairs who saw and studied the formation of the company in 1909 and who saw the ordinary stock watered to a degree which made them skeptical indeed as to the future of the amalgamation. Therefore, the statement of the president was accepted as meaning a turning point in the history of the company, and shareholders expected great things. Developments have been slow in coming, however, for when Senator Edwards made his statement the stock was on a 6% basis, and it has remained there ever since, to the disappointment of some shareholders but to the satisfaction of other more patient holders who have calmly awaited their time in the full confidence that their reward would be great.

The Canada Cement situation has become a very interesting one in market circles in the light of a number of facts, the most important of which are the following:

Most striking among the factors which bring the company into the limelight at the present time, perhaps, is its showing in 1926, when, in spite of two drastic reductions in the price of cement and the advent into one of its most profitable fields of aggressive

competition, it showed earnings practically undisturbed, and an increase of nearly three-quarters of a million in working capital. The latter increase would have been much greater except for completion of the purchase of a profitable gypsum industry in the United States. The 1926 showing of the company, with cement around $1.15 per barrel, as compared with $1.85 in the United States, is taken by careful observers to mean that the tariff has no terrors for the company. That it never need fear competition from abroad, and its obvious low production costs, leaves it little or nothing to fear from competition in its own fields.

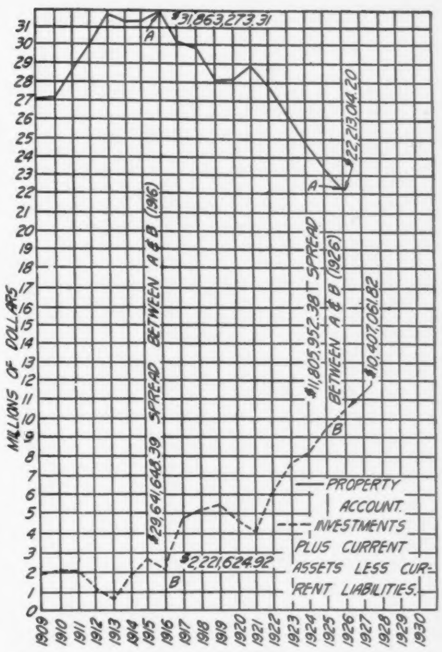
According to the president, the company achieved this splendid showing on a production basis of less than 60% of capacity. The use of cement is constantly increasing in all sorts of construction, and while 1926 was a big year in construction, predictions of improvement have already been substantiated by the January figures showing an increase of more than 30% over the construction total of January, 1926, and the unanimous opinion of leading men is that Canada is in for quite an extended period of expansion in many directions.

From organization to the end of 1917, eight years, during which time the water had been squeezed out of the stock, according to the president, the net income increased from $877,698 to $2,429,182. Investments grew from $113,800 to $914,422, and the net working capital, after numerous fluctuations natural to the squeezing-out process, increased from $2,093,903 to $3,743,145. Reserves increased from $160,000 to $1,170,000, and surplus from $217,994 to $2,577,000.

Much more striking and significant has been the advance of the company's fortunes from the beginning of 1918 to the end of 1926. The dividend has not been changed, but in those nine years (with all the water eliminated) the company has written off no less than $11,898,051 for depreciation, with the property account now standing at $22,213,014, as compared with $30,121,008. Investments have grown from $914,442 to $7,318,543, and reserves from $1,170,000 to $2,777,393 after several changes such as that in 1924, when an accumulation of $500,000, representing fire insurance reserve, was transferred to surplus account. The company has consistently shown only a small margin of profit over and above dividend requirements.

The 1926 report shows $4,543,146 of 6% bonds outstanding. These bonds fall due October 1, 1929, or a little over two and one-half years hence. The normal operation of the sinking fund will reduce the bonds outstanding to well under $4,000,000 by maturity, and the company's investment holdings already fall but little short of being double the amount of bonds outstanding.

The annual report specifies that bonds are carried at "now in excess of market value." In connection with the company's investment account it is interesting to note that investment in bonds was reduced by $625,023 in 1926, it being explained that this was accounted for by the sale of securities, proceeds of which are not yet reinvested,



Relation between property account and investments, 1909 to 1926. (Chart reproduced through courtesy of Jones, Newton and Heward, Montreal, Can.)

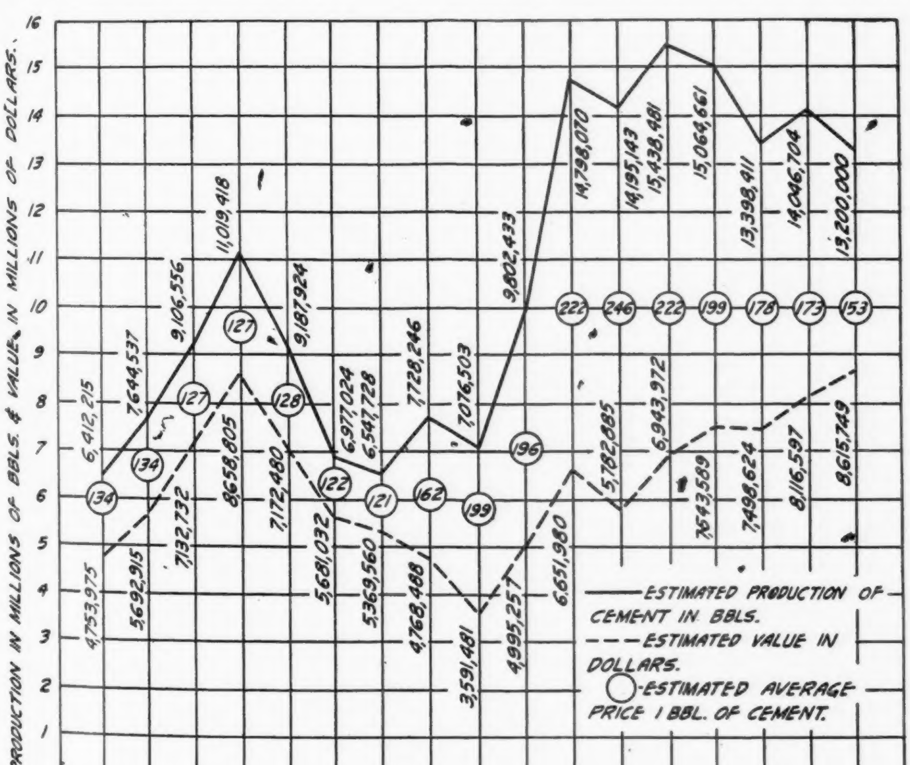
and which were shown in current assets as cash. Cash showed an increased of over a million dollars, which might or might not give an indication as to the market value of the bonds shown at $6,163,784.

The report for the year ending December 31, 1926, differs little from its predecessors for several years back.

The report shows operating profits at $1,576,996, as compared with $1,699,243 in 1925. Other income showed an increase at $697,041, bringing the total income to $2,274,007, as compared with $2,344,006. Depreciation write-off was about $107,000 more than in 1925.

Bond interest of $287,897; contingent reserve, $200,000; fire insurance reserve, $149,461; reserve for extra replacements and renewals, $16,500; preferred dividends, $735,000, and common dividend, $810,000, left surplus for the year of $35,147, bringing the profit and loss balance to $1,391,573. Net working capital increased to $9,252,302 from $8,632,590.

[Note: The charts reproduced herewith are taken from an analysis of the Canada Cement Co. compiled by Jones, Newton and Heward, members of the Montreal Stock Exchange, Montreal. Based on their survey, the Canada Cement Co. is said to produce approximately 80% of the total cement manufactured in Canada and its mills, claimed to be of sufficient capacity to supply the whole of the Canadian needs for years to come. Since 1916, the position of the company has steadily improved and in the past four years about $1,742,000 annually out of the earnings have been put back into the property. This is said to have added about $12.90 per year to the value of each of the common shares.]



Estimated Canadian production and value of cement, 1910 to 1927. (Chart reproduced through courtesy of Jones, Newton and Heward, Montreal, Can.)

Seven Missouri Cut Stone Quarries Form $5,000,000 Merger

A MERGER of seven companies operating cut stone quarries at or near Carthage, Mo., involving assets totaling $5,000,000, was announced recently by W. E. Carter, treasurer of the new company, to be known as the Carthage Marble Corp. Included in the merger are the following: S. W. Steadly & Co., Spring River Stone Co., Carthage Marble and Building Stone Co., Consolidated Marble and Stone Co., Carthage Marble and White Lime Co., Ozark Quarries Co., and the Lautz Missouri Marble Co. The merger was completed by Taylor, Ewart & Co., Chicago, and the corporation has been granted a charter by the state of Delaware. Control of the properties will be taken over within a short time.

The Taylor-Ewart Co., who underwrote the issue are offering at 100 and interest $1,800,000 first mortgage sinking fund gold bonds, series A, of the new corporation. The proceeds from this one to reimburse the treasury in part for the cost of the properties acquired and also for other purposes.

Diesel Motorship Ormidale Bonds Offered

BENJAMIN DANSARD AND CO., Detroit, Mich., are offering at 100 and accrued interest $210,000 first mortgage 6% serial gold bonds of the Diesel Motorship Ormidale, owned by the Gravel Motorship Corp. and operated by and leased to the Seneca Washed Gravel Corp., Buffalo, N. Y. The following data are from a circular describing the issue:

Vessel Description: The steel Diesel motorship Ormidale is constructed with the transverse system of framing and is the only motorship on the Great Lakes engaged in the sand and gravel business constructed for salt water service. She is full Welland canal size, viz.: 261 ft. over all; 43 ft. 6 in. beam; 23 ft. deep; constructed with two cargo compartments, and driven by two McIntosh-Seymore, 6-cylinder, 500-hp. Dieset engines, together with all necessary pumps, air compressors, electrical equipment, sand and gravel washing and separating equipment, conveyor belt mounted over the keel, conveyor belt type of boom for distribution of cargo at dock, all equipment being driven by Diesel engines as prime movers, directly connected to proper generators, which in turn are wired to electric motors at the various points of application. Suitable sand and gravel hoppers are provided in her hold, and with this equipment the Ormidale will be the most modern and the only complete steel hull, motor driven sand and gravel ship on the Great Lakes. The Diesel motorship Ormidale is also adapted to transport other cargoes, such as stone, coal, ore and similar commodities.

Lease: Coincident with the execution of the mortgage securing these bonds, the Diesel motorship Ormidale will be leased by the Gravel Motorship Corp. to the Seneca Washed Gravel Corp. at an annual rental of $70,000, this lease to remain in force as long as any of the bonds are outstanding hereunder. Said lease has been assigned to and deposited with the trustee as additional security for this mortgage.

Security: These bonds are secured by a first mortgage on the Diesel motorship Ormidale and are the direct obligations of the Gravel Motorship Corp., Buffalo, N. Y., all of whose stock is owned by the Seneca Washed Gravel Corp., which has guaranteed the payment of principal and interest of these bonds.

As additional security and guarantee for the payment of the lease, the Seneca Washed Gravel Corp. will mortgage certain valuable dock property in the city of Buffalo, said mortgage to run to the trustee for the benefit of the holders of these bonds. This dock property has been appraised by the Manufacturers' Appraisal Co. at a value of $182,685, as of today, and, upon completion of additional work now in process, will have an appraisal of $243,580.

In addition to being secured by a first mortgage on the steel Diesel motorship Ormidale and on dock property, the payment, when due, of principal and interest of these bonds, as well as the full performance of the terms of the lease, has been jointly and severally unconditionally guaranteed by Messrs. Bronson, Rumsey, Benjamin F. Milson, Delbert O. Lockhart and John J. Pendergast, who are the principal owners of the Seneca Washed Gravel Corp.

Sales and Earnings: The net earnings of the Diesel motorship Ormidale, based upon the lease income, are more than 5.5 times the interest requirements. In addition to this, the design of the Diesel motorship Ormidale is such that it is believed it will be able to handle sand and gravel at a lower cost than any other vessel on the Great Lakes. As evidence of demand for the use of this vessel, it is interesting to review the sales increase of the Seneca Washed Gravel Corp. for the past three years:

1924	$ 68,454.82
1925	179,116.95
1926	286,396.58

Tidewater Sand and Gravel Corporation Sold

THE New York Tidewater Sand and Gravel Corp., Peekskill, N. Y., which has been doing business at Roa Hook, N. Y., was sold at public auction on February 28 at a price of $145,000. The purchaser was the Bondholders Title Corp. of New York City.

The sale took place in the office of Counsel James Dempsey, in the Flatiron building, New York City, Thomas C. Macpherson of Peekskill being the referee. About six bidders were present. Mr. Dempsey was the attorney for the plaintiff, which was the Peekskill National Bank, a trustee.

The property of the corporation was knocked down to the first bidder at a price of $145,000, which was the original offer made.

The new owners stated that they planned to resume operations as soon as the weather permitted and that the products would be on the market this summer.—*Peekskill* (N. Y.) *Star.*

Drawing Held to Retire Ideal Cement Preferred

IN conjunction with the announced plan to retire $2,000,000 of the 7% preferred stock of the company, a drawing was recently completed by the Denver National Bank, transfer agent for the company. The scarcity of shares offered by the stockholders made the lottery necessary. The stockholders who own the drawn stock will be required to submit their stock for retirement at a price of $110 per share.—*Denver* (Colo.) *Express.*

Giant Portland Earnings

GIANT PORTLAND CEMENT CO. reports for year ended December 31, 1926, net profit of $493,736 after depreciation, interest and reserve for federal taxes, equivalent, after allowing for regular 7% preferred dividends, to $16.41 a share (par $50) earned on 22,108 shares of common stock. This compares with $433,802 or $13.69 a share on 22,121 shares outstanding in 1925. The following are comparative earnings of the company from 1923 to 1926, inclusive:

GIANT PORTLAND CEMENT CO.
BALANCE SHEET
(As of December 31)

Assets:	1926	1925
Real est., bldgs., machy., etc.	$2,935,070	$2,906,666
Cash	197,208	290,565
Notes and accts. receivable	142,259	85,839
Loaned on col. demand notes	50,000	200,000
Sundry debtors	3,051	2,252
Rents and interest receivable	939	1,309
Inventories	523,807	360,436
Deferred charges	25,646	8,046
Fund for redeeming bonds	29,960	49,828
Stock and mortgages owned	6,404	7,142
Total	$3,914,345	$3,912,083
Liabilities:		
Preferred stock	$1,871,400	$1,871,150
Common stock	1,105,400	1,106,050
First mortgage 6s	100,000	121,000
Accounts payable	155,910	95,962
Customers' credit balance	2,381	2,119
Payroll and unclaimed wages	19,633	19,488
Accrued interest and taxes	76,359	67,078
Reserve for contingenies, etc.	18,756	18,902
Surplus	564,506	610,335
Total	$3,914,345	$3,912,083

GIANT PORTLAND CEMENT CO. EARNINGS, 1923-26, INCLUSIVE

	1926	1925	1924	1923
Net profit from operations after provision for depreciation, local and state taxes	$584,912	$536,498	$458,491	$438,566
Bank and other interest, rents, etc.	19,554	19,672	Cr. 12,046	Cr. 13,532
Total income	$604,466	$556,170	$470,537	$452,098
Deduct—Interest on bonds, etc.	6,539	8,149	15,831	22,736
Federal income tax for year	72,957	63,929	49,461	24,179
Amount written off Norfolk property	....	....	148,181	237,560
Loss on dismantling machinery, etc.	31,233	50,289	....	....
Preferred dividends paid	(26%)486,564	(17%)318,096	(14%)261,892	(7%)131,600
Balance, surplus	$ 7,172	$115,706	Def. $4,629	$ 35,023
Shares common stock outstanding (par $50)	22,108	22,121	22,126	22,152
Earnings per share on common	$16.41	$13.69	$5.71	$1.13

Lawrence Portland Debentures Offered

THE National City Co., Chicago, Ill., are offering at 98½ and interest to yield 5.65%, $2,000,000 15-year 5½% gold debentures of the Lawrence Portland Cement Co., Siegfried, Penn. Dated April 1, 1927. To mature April 1, 1942. National City Bank of New York, Trustee.

The following information is from a letter of Frank H. Smith, president of the company:

Business and Property. Lawrence Portland Cement Co., incorporated under the laws of the commonwealth of Pennsylvania in 1898, is engaged in the manufacture of portland cement, which is sold under the well-known brand, "Dragon," in addition to which it manufactures, under contract, a mason's cement which is sold as "Hy-Test" cement. The principal properties of the company are located in the Lehigh Valley district, at Siegfried, Penn., and comprise a complete unit capable of producing 2,700,000 bbl. of portland cement and 500,000 bbl. of mason's cement, per annum. The mill, which is located adjacent to the company's large raw material reserves, is modern in design and is completely equipped with the most efficient types of electrically driven machinery. As a result of the quality and proximity of the raw material reserves, and the high operating efficiency obtained in the mill, the company has always been able to produce cement at costs which compare favorably with any in the industry. The production of this plant over a period of years is shown below:

PRODUCTION IN BARRELS

Year Ended December 31	Portland Cement	"Hy-Test" Mason's Cement
1919	1,249,500	None
1920	1,464,930	None
1921	1,524,526	3,120
1922	1,443,526	70,331
1923	1,642,626	261,751
1924	1,789,280	320,221
1925	2,017,656	303,196
1926	2,427,512	413,649

In order to supply more economically the large and growing demand for "Dragon" portland cement which it has developed in the New England market, the company has recently acquired a tract of land in or near Portland, Maine, containing a large developed deposit of limestone, and is about to construct a modern portland cement plant, with an initial capacity of approximately 1,000,000 bbl. per annum. The proposed plant will be extremely favorably located, in that shipments may be made either by rail or water, and, owing to the small production of portland cement in New England, it will be able to supply, at a freight advantage, a territory consuming several times its entire capacity output. In addition, the company contemplates the development of the present lime plant to an annual capacity of 50,000 tons.

Purpose of Issue. The company has recently offered to its stockholders the privilege of subscribing, at par, to $1,000,000 additional capital stock, and has received subscriptions for the entire amount. The proceeds from the sale of this stock and of these debentures, together with other resources, will be used for the development of the Maine properties of the company.

Security. These debentures will be direct obligations of the company and will be issued under a trust agreement which will include conservative provisions restricting the mortgaging and pledging of the company's assets or the creation of additional funded indebtedness.

Sinking Fund. The trust agreement will provide for a semi-annual sinking fund, commencing February 18, 1930, sufficient to retire $150,000, aggregate principal amount, of these debentures per annum.

Earnings. The company has operated at a profit for each year since its incorporation in 1898, and has paid dividends without interruption since 1902, the rate having been at least 8% in each of the past thirteen years. The following statement prepared by Messrs. Price, Waterhouse & Co., sets forth the earnings of the company for the four years ended December 31, 1926:

Years Ended December 31	Net Earnings Before Depreciation, Interest and Fed. Taxes	Depreciation	Net Earnings After Depreciation But Before Interest and Fed. Taxes
1923	$ 743,714	$133,567	$610,147
1924	797,213	154,498	642,715
1925	956,346	195,866	760,480
1926	1,277,074	243,981	983,093

The net earnings, as shown above, after depreciation but before interest and federal taxes, for the 4 years ended December 31, 1926, have averaged $749,109 a year, or over 6.8 times the maximum annual interest charges of $110,000 of these debentures. For the year 1926 such net earnings were over 8.9 times the maximum annual interest charges on these debentures. These earnings have been derived entirely from the Pennsylvania properties of the company, and in no way reflect the development of its properties in Maine.

Balance Sheet. The following condensed balance sheet, prepared by Messrs. Price, Waterhouse & Co., sets forth the financial condition of the company, as of December 31, 1926, without giving effect either to the sale of the additional $1,000,000 of capital stock, at par, or to the acquisition of properties at Rockland, Maine, or to the issuance of these debentures:

ASSETS

Cash	$481,444	
Accounts receivable (from selling company)	466,232	
Miscellaneous accounts receivable	2,095	
Inventories	922,275	
Total current assets		$1,872,046
Lands, building and equipment less reserves		3,796,517
Advances for purchase of property (since acquired)		300,000
Investments		55,802
Unexpired insurance		21,179
Total assets		$6,045,544

LIABILITIES

Accounts payable	$280,993	
Reserve for federal taxes	132,848	
Total current liabilities		$ 413,841
Capital stock		4,500,000
Surplus		1,131,703
Total liabilities		$6,045,544

Based on the above balance sheet, current assets are over 4½ times current liabilities, and net current assets amount to $1,458,205.

Federal Portland Increases Stock

THE Federal Portland Cement Co., Inc., Buffalo, N. Y., has increased its authorized 7% cumulative preferred stock (par $100) from 10,000 shares to 20,000 shares. It also has authorized and outstanding 20,000 shares of no par value common stock.

Bessemer Holding and Marketing Concerns Organized

COMPLETING the organization of the new ownership of Bessemer Limestone and Cement Co., two more corporations have been formed by L. A. Beeghly, president of Standard Slag Co., and his associates holding controlling interest.

One of the corporations, to be known as the Bessemer Securities Corp., will act as a holding company owning the "B" common shares of Bessemer Limestone and Cement Co. and the preferred stock of the Federal Portland Cement Co. of Buffalo, another Beeghly organization.

The other corporation, recently granted a charter in Ohio, is to be known as the Bessemer Cement Corp. It was formed with 500 shares of no par value common stock as a marketing concern to deal in cement and possibly later in kindred supplies.

New Project for Cement Plant at Seattle

INVOLVING an expenditure of between $2,000,000 and $3,000,000, the Pacific Coast Co., long identified with the industrial development of the Pacific Northwest, is contemplating construction of a huge cement plant in Seattle, it was learned recently. The company recently acquired several hundred acres of valuable rock deposits on Dall Island, southeastern Alaska, where it will obtain its material for the manufacture of cement, if the present plans are completed.

Officials of the Pacific Coast Co. declined to discuss the new industry, explaining that much experimental work is yet to be done on Dall Island.

It has been known on the Seattle waterfront for some time that experts have been at work in southeastern Alaska and surveys have been made on Dall Island, which is off the west coast of Prince of Wales Island, to determine the extent of the deposits of rock which would be mined and brought to Seattle for manufacture into a high quality of cement. The survey in Alaska has indicated, it is said, that there are deposits of rock suitable for the manufacture of cement in unlimited quantities on Dall Island. Although no details of the plans for the new industry have been announced, it is said they include the purchase of ships and their operation between Seattle and Dall Island in the transportation of the rock to this port, the purchase of a site on Elliott Bay or Lake Washington for the industry and the construction of piers and other improvements in Alaska.

The United States Coast and Geodetic Survey has been requested to make a survey of Baldy Bay, Dall Island, the location selected for piers in connection with the plans for shipment of the rock to Seattle. It was said that approximately 800 acres of rock deposits on Dall Island have been obtained by the Pacific Coast Co.—*Seattle* (Wash.) *Times.*

Traffic and Transportation

EDWIN BROOKER, Consulting Transportation and Traffic Expert
Munsey Building, Washington, D. C.

Car Loadings of Sand and Gravel, Stone and Limestone Flux

THE following are the weekly car loadings of sand and gravel, crushed stone and limestone flux (by railroad districts), as reported by the Car Service Division, American Railway Association, Washington, D. C.:

CAR LOADINGS OF SAND, GRAVEL, STONE AND LIMESTONE FLUX

District	Limestone Flux Week ended Feb. 26	Limestone Flux Week ended Mar. 5	Sand, Stone and Gravel Week ended Feb. 26	Sand, Stone and Gravel Week ended Mar. 5
Eastern	2,182	2,341	1,806	2,092
Allegheny	2,675	3,398	2,379	2,965
Pocahontas	187	213	354	285
Southern	509	452	9,375	9,680
Northwestern	880	1,040	2,455	3,221
Central Western	442	366	5,036	5,561
Southwestern	225	300	4,748	4,306
Total	7,100	8,110	26,153	28,810

COMPARATIVE TOTAL LOADINGS, 1926 AND 1927

	1926	1927
Limestone flux	*77,100*	*72,736*
Sand, stone and gravel	*212,989*	*241,161*

SOUTHERN FREIGHT ASSOCIATION DOCKET

32524. **Limestone or marble, ground or pulverized,** from Sparta, Tenn., and Cartersville, Ga., to L. & N. R. R. stations south of Nashville, Tenn. It is proposed to establish through rates on limestone or marble, ground or pulverized, carloads, minimum weight marked capacity of car, except when car is loaded to full visible capacity actual weight will apply, from Sparta, Tenn., and Cartersville, Ga., to L. & N. R. R. stations south of Nashville, Tenn., on basis of the proposed Georgia Joint Line scale, less 10%, in lieu of the present combination basis. Proposed rates for representative distances are as follows (in cents per net ton):

10 miles and over 5	99
55 miles and over 5	99
100 miles and over 95	149
150 miles and over 140	176
200 miles and over 190	185
250 miles and over 240	198

32552. **Gravel,** from Knoxville to La Follette, Tenn. Present rate, 86c. Proposed rate: On gravel, carloads, minimum weight 90% of marked capacity of car, except when cars are loaded to their visible capacity actual weight will govern—from Knoxville to La Follette, Tenn., 79c per net ton, same as current rate on sand, carloads.

32554. **Stone,** crushed or broken, from Kentucky points to Flemingsburg, Ky. In lieu of Flemingsburg Jct., Ky., combination, it is proposed to establish the following through rates: On stone, crushed or broken, carloads, minimum weight 90% of marked capacity of car, except when cars are loaded to their visible capacity actual weight will govern—to Flemingsburg, Ky.: From Frankfort and Yellow Rock, Ky., 150c; from Mullins, Pine Hill, Sparks Quarry and Mt. Vernon, Ky., 160c per net ton. On intrastate traffic, the proposed rates to apply as maximum at intermediate points. The proposed rates are for the purpose of meeting competition of stone produced in the vicinity of Flemingsburg.

32589. **Stone, broken or crushed,** from Yellow Rock, Ky., to stations on the Ohio & Kentucky Ry. Combination on O. & K. Junction, Ky., now applies. It is proposed to establish the following through rates on stone, broken or crushed, carloads, minimum weight 90% of marked capacity of car, except when cars are loaded to their visible capacity actual weight shall govern, from Yellow Rock, Ky., to Ohio & Kentucky Ry. stations: To stations Wilhurst, Ky., to Cannel City, Ky., inclusive, 158c per net ton; to stations Caney, Ky., to Licking River, Ky., inclusive, 168c per net ton. The purpose of this proposal is to enable the shippers at Yellow Rock, Ky., to meet competition of local stone.

32615. **Stone, crushed,** from Mimms and Newsom, Tenn., to Bradford and Idlewild, Tenn. Combination basis now applies. Proposed rates on—stone, crushed, carloads, minimum weight stenciled capacity of car, except when cars are loaded to visible capacity and/or in the absence of weighing facilities at shipping point, if freight is weighed in transit or at destination, carloads, minimum weight will be 90% of stenciled capacity of car—to Bradford and Idlewild, Tenn.: From Mimms, Tenn., 140c; from Newsom, Tenn., 135c per net ton. Made with relation to current rates from Cerulean, Ky.

32631. **Stone, marble or slate,** ground or crushed, etc., from L. & N. R. R. southern producing points to Hillside, Ill. In lieu of combination rates it is proposed to establish the following through rates:

To Hillside, Ill.—

From Tate, Ga. Marble, crushed, in bags, carloads, 447c; marble, ground or pulverized, in bags, carloads, 480c. (See Notes 1 and 2 for basis on these two commodities.)

From Whitestone, Ga. Stone, crushed, carloads, 447c; whitestone, powdered, carloads, 480c. (See Note 1 for basis on stone, crushed, and Note 3 for basis on whitestone.)

From Mineral Bluff, Ga. Marble or limestone, crushed, in barrels, bags or bulk, carloads, 438c. (See Note 1 for basis.) Marble or limestone, ground or pulverized, in barrels, bags or in bulk, carloads, 480c. (See Note 3 for basis.)

From Kinsey, N. C. Marble or limestone, crushed, in barrels, bags or in bulk, carloads, 447c. (See Note 1 for basis.) On marble or limestone, ground or pulverized, in barrels, bags or in bulk, carloads, 480c. (See Note 3 for basis.)

From Cartersville, Ga. Calcite, ground or pulverized (ground or pulverized limestone or marble), carloads, 480c. (See Note 3 for basis.)

From Bolivar and Fairmount, Ga. Stone or slate, crushed, carloads, 447c. (See Note 1 for basis.)

From Marmor, Tenn. Stone, marble or slate, broken or crushed, carloads, 411c. (See Note 1 for basis.)

From Knoxville, Tenn. Stone, marble or slate, broken or crushed, and marble spalls, carloads, 411c. (See Note 1 for basis.)

From Brownson, Emauhee and Gantt's Quarry, Ala. Marble, crushed, carloads, 447c. (See Note 1 for basis.) Marble dust, carloads, 480c. (See Note 3 for basis.)

Note 1. Local or proportional rate to Ohio river crossings, plus northern lines' specific beyond.

Note 2. Same as to Chicago, Ill.

Note. 3 Same as from Tate, Ga.

32639. **Sand,** glass, from Mendota and Silica, Va., to Hopewell, Va. Lowest combination now applies. Proposed rate on sand, glass, grinding or molding, carloads, minimum weight 90% of marked capacity of car, except when cars are loaded to their visible capacity, actual weight will govern—from Mendota and Silica, Va., to Hopewell, Va., 212c per net ton, made with relation to current rate on this commodity to Richmond, Va.

32654. **Sand and gravel,** from Montgomery, Ala., to G. F. & A. Ry. stations. In lieu of combination basis, it is proposed to establish through commodity rates on: Sand and gravel, carloads, minimum weight 90% of marked capacity of car, except when cars are loaded to visible capacity, actual weight will apply. From Montgomery, Ala., to G. F. & A. Ry. local stations, inclusive, made on basis of the proposed Alabama-Georgia scale, less 10%, for application over trunk and short lines. Proposed rates range from 202c to Spring Hill, Fla., to 208c per net ton to Carrabelle, Fla.

32676. **Sand,** from Western Junction, Ala., to Birmingham, Ala., and group. In lieu of rate of 95c per net ton (combination), it is proposed to establish through rate of 85c per net ton on sand, carloads, minimum weight 90% of marked capacity of car, except when cars are loaded to their visible capacity, actual weight will govern, from Western Junction, Ala., to Birmingham, Ala., and group, made with relation to rate from Selma to Birmingham.

CENTRAL FREIGHT ASSOCIATION DOCKET

15261. To establish on **sand and gravel,** carloads, from Jonesville, Mich., to various points in Indiana and Ohio, rates as per Exhibit A attached. Present rates—As per Exhibit A attached.

EXHIBIT A.

Commodity—Sand (except blast, core, engine, filter, fire or furnace, foundry, glass, grinding or polishing, loam, molding or silica) and gravel, carloads, Jonesville, Mich. (Rates in cents per net ton.)

To—	Miles.	Scale rate.	Mich. scale rate.	Proposed rate.
Albion, Ind., via N. Y. C., Auburn Jct., Ind., B. & O.	71	115	102	115
Bowling Green, Ohio, via N. Y. C., Toledo, N. Y. C. (O. C. L.)	91	127	107	122
Bowling Green, Ohio, via N. Y. C., Toledo, B. & O.	6	127	107	122
Elkhart, Ind., via N. Y. C. direct	72	115	90	86
Findlay, Ohio, via N. Y. C., Toledo, N. Y. C. (O. C. L.)	114	138	112	127
Findlay, Ohio, via N. Y. C., Toledo, B. & O.	125	138	117	127
Fostoria, Ohio, via N. Y. C., Toledo, H. V.	105	138	112	127
Fostoria, Ohio, via N. Y. C., Toledo, N. Y. C. (O. C. L.)	106	138	112	127
Fostoria, Ohio, via N. Y. C., Ft. Wayne, N. Y. C. & St. L.	163	173	127	127
Garrett, Ind., via N. Y. C., Auburn Jct., Ind., B. & O.	56	104	92	104
Hicksville, Ohio, via N. Y. C., Auburn Jct., Ind., B. & O.	69	115	107	115
Ligonier, Ind., via N. Y. C. direct	75	115	90	90
Maumee, Ohio, via N. Y. C., Toledo, Wabash	79	127	102	112
Maumee, Ohio, via N. Y. C., Toledo, N. Y. C. & St. L.	79	127	102	112
Middlebury, Ind., via N. Y. C. direct	62	115	85	88
Millersburg, Ind., via N. Y. C. direct	79	127	90	90
Mishawaka, Ind., via N. Y. C. direct	83	127	90	86
Montpelier, Ohio, via N. Y. C., Adrian, Mich., Wabash	76	127	102	127
Perrysburg, Ohio, via N. Y. C., Toledo, B. & O.	81	127	102	117
South Bend, Ind., via N. Y. C. direct	87	127	95	86
Thomaston, Ind., via N. Y. C., LaPorte, P. M.	132	161	122	161
Thomaston, Ind., via N. Y. C., Ft. Wayne, N. Y. C. & St. L.	163	173	127	161
Waterville, Ohio, via N. Y. C., Toledo, N. Y. C. & St. L.	85	127	102	117

Present rates on sixth class basis, except to Elkhart, Ind., commodity rate of 90c per ton is in force as published in N. Y. C. R. R. I. C. C. L. S. No. 1307.

15222. To establish on **stone, crushed,** in bulk, carloads, Milltown, Ind., to Enosville, Ind., rate of 103c, and to Coe, Ind., 105c per net ton. Present rates, **6th class.**

15223. To establish on **sand and gravel**, carloads, following rates:
From Lafayette, Ind. (C. C. C. & St. L. Ry.)
To Illinois stations on T. P. & W. Ry.

	Proposed Per N. T.		Proposed Per N. T.
Secor	101c	Farmdale	112c
Eureka	101c	East Peoria	112c
Crugger	112c	Peoria	112c
Washington	112c		

Present rates, 6th class.

NEW ENGLAND FREIGHT ASSOCIATION DOCKET

11818. **Lime**, from stations in New England on B. & A., B. & M., Maine Central, N. Y. N. H. & H. R. R., and St. J. & L. C. R. R.s taking "Boston and Lowell" rate groups as per Frank Van Ummersen's (agency) I. C. C. 50, to points in Central Freight Association territory, rates predicated on estimated differential relationship with rates established from Philadelphia, Penn., effective Feb. 19, 1927, in Supplement 35, Agent Wilson's I. C. C. A157, in compliance with Interstate Commerce Commission's decision in Docket 16170. Reason—To restore relationship.

11825. **Lime**, in bulk, carloads, minimum weight 60,000 lb., from Canaan, East Canaan, Conn., to Harlem River, N. Y., $1.87 per ton of 2000 lb. Reason—Suggested for competitive reasons.

NEW ENGLAND FREIGHT ASSOCIATION DOCKET

11941. **Lime**, carloads, minimum weight 50,000 lb. per car, from Ashley Falls, Mass., and other points shown as points of origin in Item 580 in N. Y. N. H. & H. R. R. I. C. C. F2873, to Chenango Bridge and Forks, Itasca, Whitney, Plain, Lisle, Killawog, Marathon, Messenicsville, Blodgettville and Cortland, N. Y. (D. L. & W. R. R.), 17½c via C. N. E. Ry., N. Y. N. H. & H. R. R., L. & H. R. R., D. L. & W. R. R. Reason—To establish rates to the points involved which do not exceed the rate to Syracuse, N. Y., for D. L. & W. delivery; from the points of origin covered by this proposal so that there will be no fourth section violation in these rates.

11944. **Lime**, carloads, minimum weight 40,000 lb., from Fonda Jct., Highgate Springs, Swanton, Winooski, Vt., to Pier 37, E. R., N. Y., and Brooklyn Contract Terminals, Brooklyn, N. Y., 22, via New London, N. Y. N. H. & H. R. R. Reason—To place Pier 37 and Brooklyn Contract Terminal; also, Brooklyn, N. Y., on the same basis as is now in effect to N. Y. C. R. R. New York and Brooklyn, N. Y., stations.

11958. **Sand**, sea, carloads, minimum weight 90% of marked capacity of car, from Provincetown, Mass., to Springfield, Mass., 14 (this rate includes B. & A. R. R. switching charges at destination). Reason—To provide rate that will include B. & A. R. R.

11961. **Lime**, carloads, minimum weight 40,000 lb., from Fonda Jct., Highgate Springs, Swanton and Winooski, Vt., to Cumberland Mills, Maine, 16, via C. V. Ry., Cambridge Jct. or Sheldon Jct., Vt., St. J. & L. C., St. Johnsbury, Maine, C. R. R. Reason—To establish the same rate as is now carried to Cumberland Mills, Maine, B. & M. R. R. delivery.

WESTERN TRUNK LINE DOCKET

1811E. **Sand and gravel**, carloads, minimum weight 90% of the marked capacity of car, except that when actual weight of shipment loaded to full visible capacity of car is less than 90% of marked capacity, the actual weight will govern, but in no case shall the minimum weight be less than 40,000 lb., from Clayton, Ia., to Peoria, Ill. Present—$2.16 per net ton. Combination rate based on Rock Island, Ill. Proposed—8c per 100 lb.

2292D. **Crushed stone**, carloads, minimum weight 90% of marked capacity of car, but not less than 40,000 lb., from Ely, Minn., to East St. Louis, Ill., and St. Louis, Mo. Present, 19½c per 100 lb.; proposed 18c per 100 lb.

ILLINOIS FREIGHT ASSOCIATION DOCKET

2905-C. **Stone or rock ganister**, ground, carloads, from Chicago, Ill., to Peoria, Ill., Milwaukee, Wis. (rates in cents per net ton):

To—	Present.	Proposed.
Mississippi River and Ohio River	315	290
Crossings, Thebes, Ill., to Cincinnati, Ohio, inc. (on traffic destined southeastern and Carolina territories)	378	353

TRUNK LINE ASSOCIATION DOCKET

14857. **Lime**, common, hydrated, to Bethlehem, Penn., $3.50 per 2000 lb. for Reading Co. and Lehigh Valley R. R. deliveries and $3.60 per 2000 lb. for other deliveries. Reason—Rates are comparable with rates on like commodities from and to points in the same general territory.

TEXAS-LOUISIANA TARIFF BUREAU DOCKET

6879-TX. **Crushed stone**, carloads, from Lone Star Spur, Texas, to Dodsonville and Wellington, Texas. Proposition from shippers to establish rate of 9c per 100 lb. on crushed stone, carloads, minimum weight as provided for in Item 1750 of Tariff 2-L, from Lone Star Spur, Texas, to Dodsonville and Wellington, Texas.

SOUTHWESTERN FREIGHT BUREAU DOCKET

11629. **Lime**, from Mercer, Ark., to points in Oklahoma. To establish the following rates in cents per 100 lb. on lime, carloads, minimum weight 30,000 lb., from Mercer, Ark., to points shown below:

To—	Rates
Owen, Okla.	22½
Hulah, Okla.	22½
Bowring, Okla.	24
Bigheart, Okla.	24
Nanos, Okla.	24
Opah, Okla.	24
Pawhuska, Okla.	24

The operators of the Mercer, Ark., plant have asked for the publication of rates to Pawhuska and intermediate points on the A. T. & S. F., and it is presumed there would be no objections in that the basis is to be the same as from Ruddells, Ark., or 1½c per 100 lb. higher than when from Springfield, Mo.

11652. **Chatts and gravel**, from Waco, Mo., to points in Kansas. To establish the following rates, in cents per 100 lb., on chatts, gravel, sand and tailings (lead and zinc), carloads. Minimum weight: Minimum weight, 90% of marked capacity of car, except that when weight of shipment loaded to full visible capacity of car is less than 90% of marked capacity of car, the actual weight will apply, but in no case shall the minimum weight be less than 40,000 lb., from Waco, Mo., to points in Kansas shown below:

To—			Rates
Walnut	5	Chanute	5½
Trent	5	Earlton	5½
Erie	5	Thayer	5½
Shaw	5½	Morehead	5½
Rollin	5½	Cherryvale	Same

The present rates are based on combination of locals on Frontenac, Kan., account no through rates published. The proposed rates, it is stated, are the same or higher than the Kansas City two-line maximum scale.

18827. Rate of 12c on sand from Pacific, Mo., to Ft. Smith, Ark., unreasonable over St. Louis-San Francisco R. R. but applicable and reasonable over the Missouri Pacific R. R. The distance over the Frisco is 381 miles and over the Missouri Pacific, 530 miles. Reparation awarded in that it exceeds 11.5c rate over the Frisco.

18547. Rate of 6c on gravel from Holiday, Kan., to Standish, Mo., unreasonable and prejudicial to the extent it exceeds 5.5c Reparation awarded on that basis.

18175. Excess charges on cement, gravel, etc., between points in Alabama and Georgia on the Chattahoochie Valley R. R. illegal and reparation awarded. Charges collected were on the basis of published rates for C.L. shipments, the excess in proportion.

18408. Present restrictions as to routing of cement in carloads from Hudson, N. Y., to destinations on the N. Y., N. H. & H. R. R., et al., not in violation of the 3rd section of I. C. C. act. Complainant desired defendant to open certain other junctions and routes now open to other shippers so that a saving in time and length of haul would be effected, the restricted route approximating 35% circuiting over proposed route. Defendants contended that increased operation cost to them would result and congestion of traffic along proposed route, consequently the state line was most logical.

12704. Rates authorized on plaster and gypsum products from points in Iowa, Michigan and Ohio to destinations in Illinois, Indiana, Wisconsin and west bank of the Mississippi lower than to intermediate points. Relief granted on petition to equalize rates from various origin points to defined territory and based on circuiting of lines.

17944. Rate of $3.83 per long ton on phosphate rock from Brewster, Fla., to Pelham, Ga. Not unreasonable or unduly prejudicial.

17647 and **17649.** Distance rates on interstate shipments of sand and gravel, from Janesville, Afton, Riton and Beloit, Wis., and South Beloit, Ill., to certain destinations on the Northwestern and the Milwaukee, in southeastern Wisconsin and northern Illinois, inapplicable and refund of overcharges to the basis of the applicable rates authorized. Rates applicable on like traffic to destinations on the Northwestern, between Kenosha, Wis., and Evanston, Ill., not unreasonable, and that rates on like traffic to Rogers Park, Rose Hill and Ravenswood, Ill., assessed against the traffic, applicable and not unreasonable. Case dismissed.

I. and S. 2876. Schedules on lime producing points in Alabama, Georgia, Kentucky, Tennessee and Virginia to points south of the Ohio and east of the Mississippi suspended until July 10. Rates to be revised.

Georgia Aggregate Rate Revised

EFFECTIVE April 1, 1925, the Georgia Public Service Commission passed an order revising all the rates in Georgia on sand, gravel, crushed stone and other roadway and construction materials, which had the effect of reducing some of the rates in Georgia, but also increased some of the Georgia rates. The order provided that the rates between points in Georgia should be no higher than the rates on these materials from points in other states to points in Georgia, which resulted in some of the rates from Montgomery, Birmingham and Chattanooga being increased.

The commission, in defending the shippers at Howard and Junction City, showed that approximately 30,000 cars per annum were shipped to Birmingham from these points, and if the shippers at Howard and Junction City were not permitted to compete with Montgomery on a fair basis it would have the effect of destroying their business, which represented investments of many thousands of dollars. The Georgia commission also contended that the intrastate rates in Alabama were not involved, and therefore it would not be fair to require the shippers at Howard and Junction City to pay higher rates without making some revision from Montgomery. The Interstate Commerce Commission sustained the contention of the Georgia Public Service Commission and stated in its order that the complaint filed by the Alabama shippers against Howard and Junction City would be dismissed, and there will be no change in these rates until some revision is made in the Alabama intrastate rates.

Lime—Production and Uses—on Chemical Society Program

Richmond, Virginia, Meeting, April 11-16, Will Mark an Epoch in History of the American Lime Industry

VIRTUALLY every phase of the lime industry, and especially the use of lime by the chemical industries, which consume more than 40% of the production in this country, will be discussed by the American Chemical Society at its spring meeting in Richmond, Va., April 11-16, when three half-day sessions of the industrial division will be devoted exclusively to lime.

Lime is used by 115 industries in their processes, and this fact, together with the advance in scientific knowledge of the material and its properties, has stimulated interest of the society members to such a point that the projected symposium bids fair to be one of the outstanding features of the meeting.

Men prominent in industrial circles and leaders in the 115 industries are on the program, which includes the discussion of twenty-two subjects in addition to the introductory address of Prof. James R. Withrow, head of the Department of Chemical Engineering, Ohio State University, who will preside. Professor Withrow will confine his introductory remarks to the broad subject, "The Problems of the Lime Industry." The speakers include leaders in the industries manufacturing and using lime and chemists interested in investigational work.

The program includes papers on the manufacture of lime and its use in the following important industries: Paper, leather, soap, textiles, glass, agriculture, creamery, metallurgy, refractories, alkali and bleach. In addition, a number of subjects of interest to all industrialists, scientists and the public, such as water-softening and purification, sewage and sanitation, and treatment of trade wastes, will be discussed.

During 1926, the last figures available, there were produced approximately 5,000,000 tons of lime with a value of $46,500,000, of which about 45% was consumed by the chemical industries, not including the large tonnage consumed by those industries which produce their own lime.

The symposium will be held all day April 13 and the morning of April 14. The subjects and speakers will be:

April 13, 9:30 A. M.

I. Introduction

9:30 A.M.—"The Problem of the Lime Industry." James R. Withrow, chairman.

II. General Hearing of Lime Problems

9:45 A.M.—"The Consumer—The Market—The Lime Business and the Chemical Industry," Charles Warner, president, National Lime Association and of the Charles Warner Co., Wilmington, Del.

10:10 A.M.—"Present Progress and Future Tendencies in the Lime Industry," Oliver Bowles, superintendent Non-Metallic Minerals Experiment Station, U. S. Bureau of Mines, New Brunswick, N. J.

10:30 A.M.—"General Research Problems of the Lime Industry," Prof. R. T. Haslam, Massachusetts Institute of Technology.

10:50 A.M.—"Bridging the Gap between Research and Profits in the Lime Industry," W. E. Carson, president, Riverton Lime Co., Riverton, Va.

11:15 A.M.—"Limes Used in Causticizing and Some Variables Affecting Their Behavior," J. V. N. Dorr, president, and A. W. Bull, research chemist, the Dorr Co., 247 Park Avenue, New York.

III. Problems of Specific Lime Uses

11:40 A.M.—"The Composition of Commercial Limes and Their Specification for Industries." J. M. Porter and J. S. Rogers, U. S. Bureau of Standards, Washington, D. C.

12:00 noon—"The Lime Problem of Agriculture." J. A. Slipher, Ohio State University, Columbus, Ohio.

2:00 P.M.—"Lime Problems in the Softening and Sterilization of Water." C. P. Hoover, chemist in charge, City Purification Wks., Columbus, Ohio.

2:25 P.M.—"The Uses of Lime in Butter Making." Prof. O. R. Overman, University of Illinois, Urbana, Ill.

2:45 P.M.—"Importance of the Proper Lime in the Use of Liquid Chlorine for Bleaching and Sterilization." A. H. Hooker, Hooker Electrochemical Co., Niagara Falls, N. Y.

3:10 P.M.—"The Use of Lime in the Paper Industry." P. A. Paulson, Kimberly-Clark Paper Co., Appleton, Wis.

3:30 P.M.—"Lime Problems in the Beet Sugar Industry." Ralph Shafor, Great Western Sugar Co., Denver, Colo.

3:50 P.M.—"The Role of Lime in Tanning." George D. McLaughlin, University of Cincinnati.

IV. Research, Development and Engineering in the Lime Industry

4:15 P.M.—"Lime Treatment in Disposal of Pea Cannery Wastes." L. F. Warrick, Wisconsin State Board of Health, Madison, Wisconsin.

4:30 P.M.—"X-Ray Studies of Limes." Marie Farnsworth, Washington Square College, New York University, New York City.

April 14, 9:30 A. M.

IV. Research, Development and Engineering in the Lime Industry

9:30 A.M.—"The Effect of Particle Size on the Hydration of Lime." Fred W. Adams, Field Station, M. I. T., South Brewer, Me.

9:50 A.M.—"High Temperature Whitewash." E. P. Arthur, Parkersburg, W. Va., and James R. Withrow.

10:10 A.M.—"Economies Through the Use of Lime in Open Hearth Practice." C. H. Herty, Jr., Bureau of Mines, Pittsburgh, Pa.

10:40 A.M.—"A Brief Analysis of the Function of Steam in the Lime Kiln." E. E. Berger, New Brunswick Station, U. S. Bureau of Mines.

11:00 A.M.—"Rotary Kilns vs. Shaft Kilns for Lime Burning." R. K. Meade.

11:30 A.M.—"The Science and Engineering of Lime Burning." V. J. Azbe, 6625 Delmar Boulevard, St. Louis, Mo.

V. Summary

12:00 noon—"Summation of Needs and Future of Lime in the Chemical Industry." James R. Withrow, chairman.

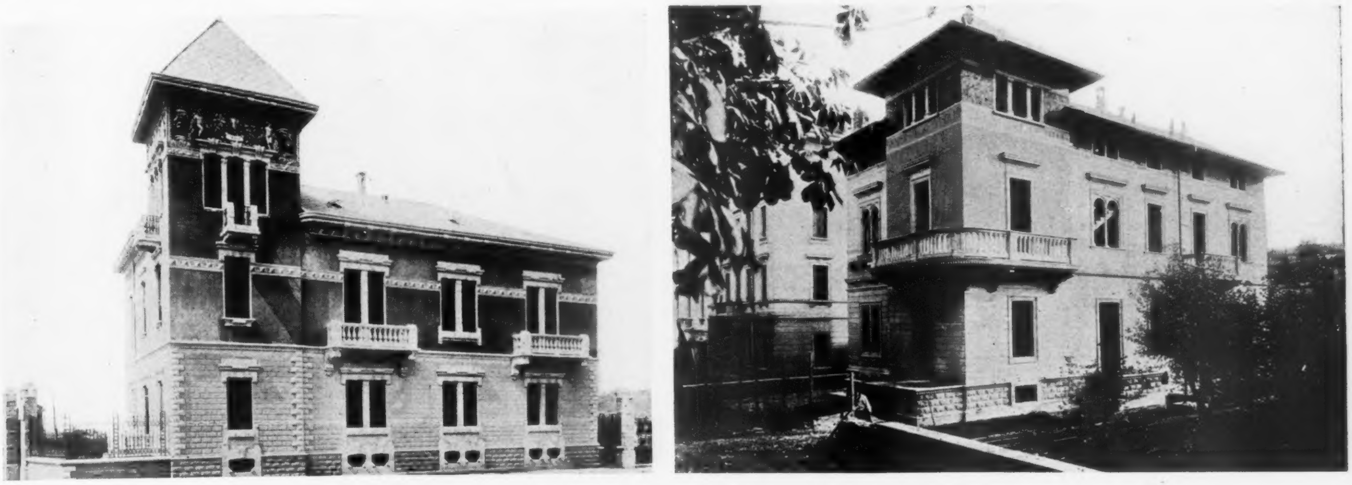
A considerable number of lime manufacturers are expected to attend the meetings.

F. A. Boeye Vice-President of North American Cement

FREDERICK A. BOEYE, general sales manager of the North American Cement Corp., Albany, N. Y., was elected vice president of the company, continuing also in his former capacity, and Thomas J. Harte was named as assistant general sales manager, according to a recent announcement by the company. Luther G. McConnell, the report also states, has resigned as vice president to accept a position with a New York bank.

Cement Products

TRADE MARK REGISTERED WITH U. S. PATENT OFFICE



Building erected using the corrugated slab system of construction

Pre-Cast Concrete and Gypsum Building Units

SPECIAL forms of precast concrete building units have come and gone in great number in the past five or ten years. Some which possessed undoubted merit failed because they were not sufficiently "promoted," or because the style of building to which they were best adapted went out of fashion in some degree. Others had no real merit being only variations of a common form pushed on the market in the endeavor to collect royalties. This has caused the concrete products industry to be somewhat skeptical whenever a new form of building unit was proposed, and this attitude of mind has perhaps acted to bar certain novel forms which might mark a real advance in concrete masonry construction.

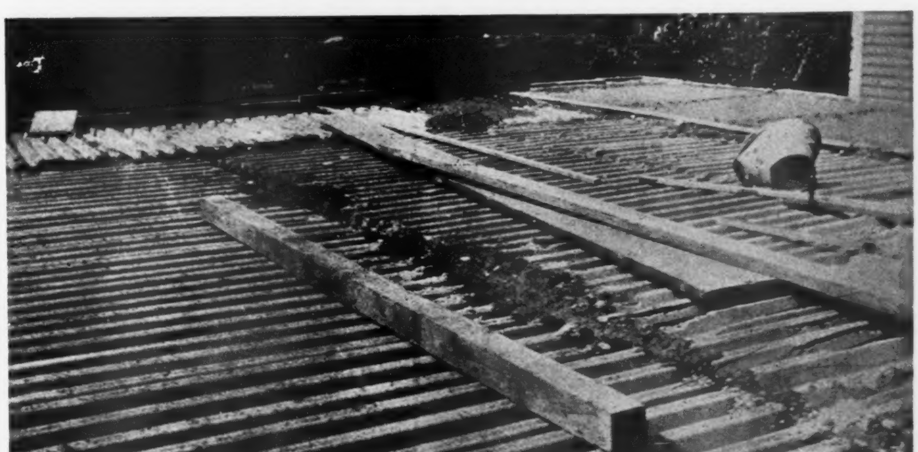
Based on Good Principles

Of the patented unit to be described here, all that can be said of it is that it seems to be formed on good principles of construction and, as the photographs show, it has been used successfully on structures of considerable importance. The inventor is Robert L. Day, an architect of many years experience, of Huntington, W. Va. A decided novelty in his system is the use of gypsum panels, which are precast like concrete products, to use as insulation, and for lightness, behind walls of concrete block.

The main unit of the system is a corrugated slab which is cast in a steel mold. This has reinforcing rods in the corrugations making a light and strong slab. It is used as the basis of construction in roof, walls and floors.

One of the smaller drawings shows the steel mold used for making this slab, the cast slab with the reinforcing rods shown in dotted lines and a section which shows the proportionate depth of the corrugations. A second drawing shows the slabs used in floor construction with terrazzo or other flooring of the same general sort laid on the slabs and float finished. The construction of the roof is somewhat the same as this except that some of the drawings show the corrugated slabs to be cast in gypsum, instead of concrete, which is afterward covered with concrete.

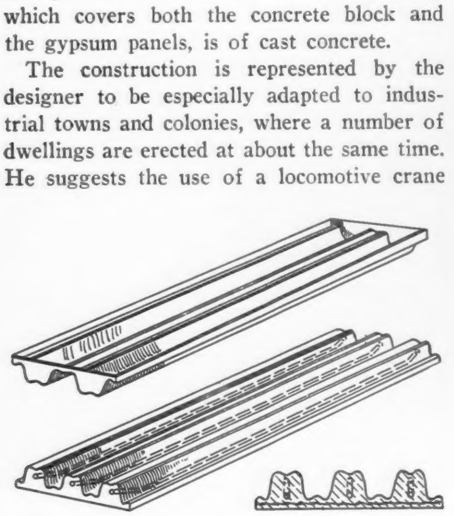
The isometric drawing of wall construction is very interesting as it shows the construction in so much detail. The foundation is of concrete block of the ordinary cored form. On this are erected the panel slabs of gypsum, cast in the corrugated form, with



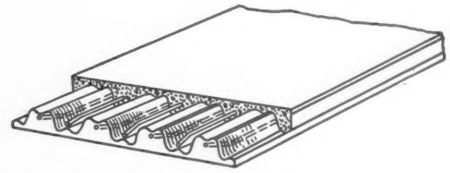
Construction view showing corrugated floor slabs in place ready to receive the flooring composition

dowel rods running down into the foundation. As a facing a special form of half block, made of concrete, is used. The coping which covers both the concrete block and the gypsum panels, is of cast concrete.

The construction is represented by the designer to be especially adapted to industrial towns and colonies, where a number of dwellings are erected at about the same time. He suggests the use of a locomotive crane which can be of service in clearing the ground and excavating and then be used to lift and place the heavier slabs.



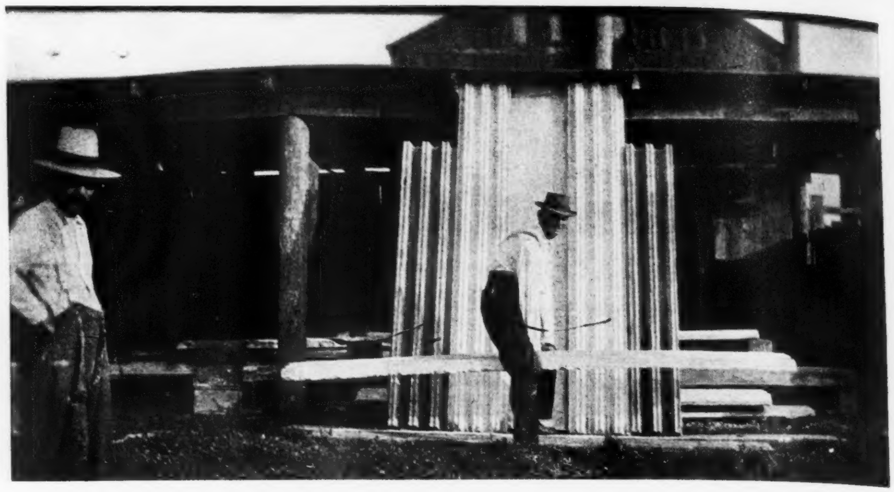
Steel mold for casting corrugated gypsum or concrete slabs. The section shows the proportionate corrugation depth and reinforcing rods



A section of the floor. Composition or terrazzo are laid over the corrugated slabs and float finished

The illustrations show some of the details of construction. One of them is of corrugated floor slabs already placed and ready to receive the flooring composition. Another shows the vertical slabs cast of gypsum ready to be put in place in a lower story.

The whole industry of building construction is undergoing a slow but sure revolution, in which "rock products" are taking a constantly growing part.



The corrugated slabs can easily be handled by one man. The brittleness is overcome to a great extent by the reinforcing rods

Southeastern Stone-Tile Manufacturers Meet at Chattanooga

THE two-day session of the Southeast Stone-Tile Manufacturers' Association closed March 12 at Chattanooga, Tenn., with a banquet given by the Penn-Dixie Cement Corp. at the Hotel Patten. Among speakers at the banquet were Mayor Richard Hardy, C. S. Gantlett and E. K. McGrath of the Dixie Concrete Products Co., and C. F. Ferguson of Roanoke, Va.

Saturday was spent mostly in general discussion by the delegates of different problems of the stone-tile industry. On Friday speeches were made by J. A. Cassidy of the Keating-Cassidy Brick and Tile Co.; J. J. Cantwell of the Southern Brick and Tile Co., and L. L. Wagner of the National Stone Tile Corp., Los Angeles.

Southeast Stone-Tile Manufacturers' Association, although organized only comparatively recently, has grown rapidly. At the present meeting representatives of fifteen different plants are in attendance and the membership of the association is growing rapidly.

Present officers are E. K. McGrath, president, of the Dixie Concrete Products Co.; J. J. Cantwell, vice-president, of the Southern Brick and Tile Co.; J. S. Bailey, secretary-treasurer, Keating & Cassidy Brick and Tile Co.

Bernard Wilkins, representative for the southeastern states of the National Stone-Tile organization, has been in attendance at all meetings and made several talks. Mr. Wilkins, whose territory covers 14 states, intends to make his headquarters here.—*Chattanooga* (Tenn.) *News.*

Florida Products Plants Consolidated

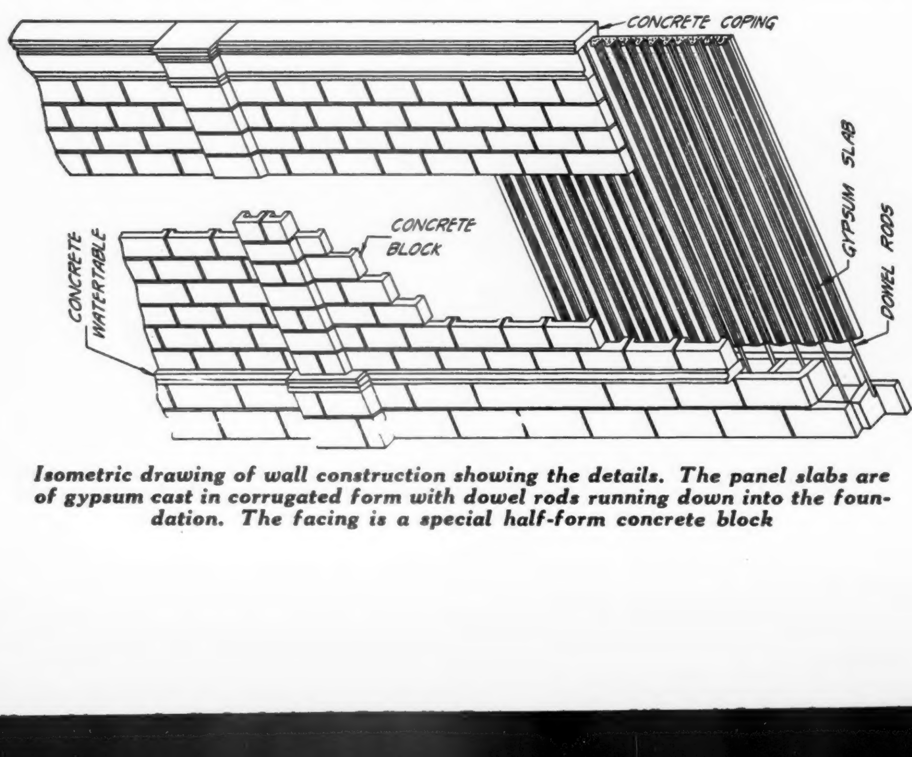
E. A. HOSELTON, of Orlando, Fla., has been named president of the Duntile Corporation of Florida, capitalized at $500,000, at its first meeting held in Orlando recently. Other officers selected were: A. D. Cranston, of Lake Worth, first vice-president; A. Humphrey, of Tampa, second vice-president; F. and J. W. Sage, of St. Cloud, treasurer.

The board of directors will be composed of the officers and E. M. Kirk, of St. Augustine; R. B. Sherman, of De Land; W. A. Stewart, of Frostproof, and C. A. Jensen, of Lake Worth.

Architectural Cast-Stone Association Formed at Los Angeles

AN association of several of the largest producers of architectural cast stone (concrete) was formed recently at Los Angeles, Calif., for the purpose of improving the uniformity of art stone through a standard specification providing for certified tests and inspection. This new specification will be put into effect at once, it was announced.

According to Frank M. Brooks, president of the newly formed Associated Art Stone Manufacturers, architects who avail themselves of the standard specification automatically subject the product and manufacturer to laboratory inspection and tests.



Isometric drawing of wall construction showing the details. The panel slabs are of gypsum cast in corrugated form with dowel rods running down into the foundation. The facing is a special half-form concrete block

Effect of Weather Conditions on Curing of Concrete Block*

THE investigations outlined below were made for the purpose of studying the effect of outdoor storage on the strength and absorption of concrete building block made at various seasons of the year. No particular study had heretofore been made to determine weather effect on concrete block during yard storage. The sub-committee on curing, of committee P-6, outlined a series of tests which were followed to get the necessary data.

The block under examination were made at the Diamond Block Co., St. Paul, Minn. All laboratory tests on the block were conducted in the laboratories of the structural division, civil engineering department, University of Minneosta, under the direction of Prof. M. B. Lagaard and Frank E. Nichol. The investigations were under the supervision of Earle D. McKay, assisted by R. C. Cooper, both of the Universal Portland Cement Co.

The test blocks were made under conditions which were to be as like as possible. They were all 8x8x16-in. 3-cored and made on a Papko vertical stripper machine, equipped with automatic tampers. Mixing of materials was done in a Blystone mixer. Aggregates and water were measured in graduated containers. The aggregate in each case was a mixture of 0-No. 4 sand, 0-No. 4 limestone screenings and No. 4 to ⅜-in. pebbles; the fineness modulus of the mixed aggregate being 4.15. The consistency was as wet as practicable. Proportions of cement to mixed aggregate was 1:7 by volume of dry and rodded materials. The aggregates were measured separately, the proportions by volume being: 2 parts limestone screenings, 3 parts sand and 3 parts pea gravel. Before making block, tests were made on moisture in the aggregate and bulking and suitable allowance for these made in the proportions to be mixed.

Procedure

The aggregate and cement after measurement were placed in the mixer and mixed for about one minute; then the water was added and the materials given a three minute mix. During the winter, aggregate and water were both heated to 70 deg. F. before entering the mixer. The same number of tamps (9) were given each block in the machine. The block were initially cured for 24 hr. in moist room at about 70 deg. F. or in steam room at 125 deg. F., then outdoors for 28 or 90 days, after which they were broken on the Olsen machine and the results recorded. Some block with the same initial curing were stored in the laboratory up to the testing period and broken for purposes of obtaining data on the effect of indoor storage.

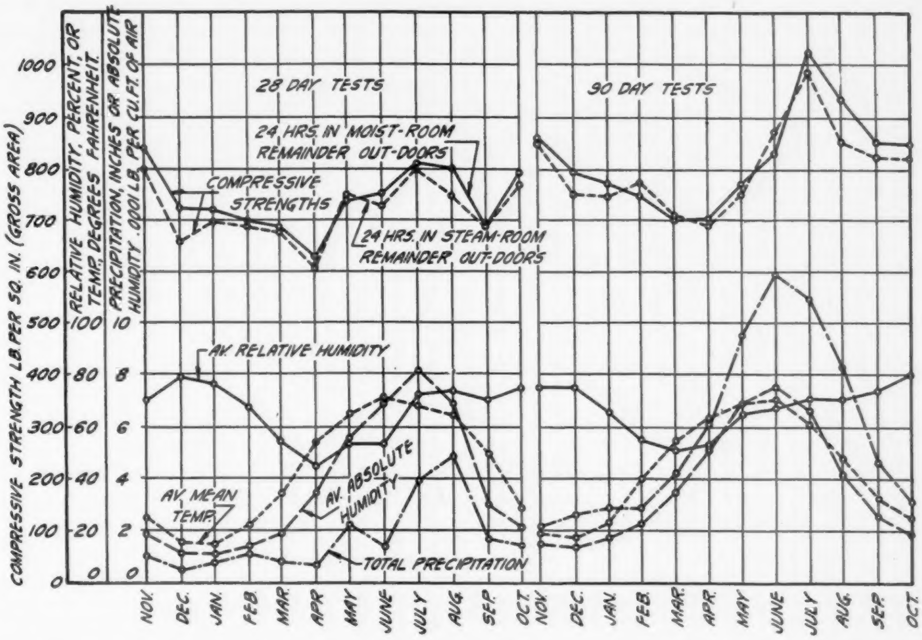


Fig. 1. Compressive strengths of blocks broken at various times under different curing and weather conditions

At regular intervals, about one month apart, blocks were made and tested at 28 and 90 days after the usual initial curing followed by the storage in the open. The average of these tests follows:

28-DAY TESTS WITH 24-HR. INITIAL CURING

	Moist Room — Compressive strength. lb./sq.in. Gross Area	Moist Room — Net Area	Steam Room — Compressive strength lb./sq.in. Gross Area	Steam Room — Net Area
Grand average..	740	1270	720	1240
High..................	(Nov.) 845	1455	(July) 810	1390
Low..................	(Apr.) 635	1090	(Apr.) 610	1050
Difference..........	210	....	200	....
Difference in % Grand ave.....	28	....	28	....

90-DAY TESTS WITH 24-HR. INITIAL CURING

	Moist Room — Compressive strength. lb./sq.in. Gross Area	Moist Room — Net Area	Steam Room — Compressive strength lb./sq.in. Gross Area	Steam Room — Net Area
Grand average..	820	1410	800	1370
High..................	(July) 1015	1750	(July) 990	1700
Low..................	(Mar.) 700	1200	(Mar.) 715	1230
Difference	315	....	275	....
Difference in % Grand ave.....	38	....	34	....

The average strengths of block stored in the laboratory after initial curing of 24 hr. in the moist room or steam room and broken after 28 and 90 days, respectively, gave the following:

28-DAY	Moist room	Steam room
Gross area...........................	825	785
Net area...............................	1420	1350
90-DAY	**Moist room**	**Steam room**
Gross area...........................	860	845
Net area...............................	1480	1450

The principal data on all the tests are plotted in Fig. 1, shown herewith. This includes the meteorological conditions which were considered in making the tests. The conclusions from this investigation are:

Conclusions

(1) There was no appreciable difference in strength at 28 or 90 days of block cured the first 24 hr. in moist room at 70 deg. F. or in steam room at 125 deg. F.

(2) The maximum range in compressive strength of the 28-day block for the 12 months was 28% of the grand average of all 28-day block. For the 90-day block this range was 36%.

(3) The compressive strength at 90 days averaged 11% greater than that at 28 days.

(4) The summer and fall months are more favorable for outdoor curing of block than the spring and winter months.

(5) Temperature, humidity and precipitation are the most important factors entering into the curing of concrete block. In general the warm, humid and rainy seasons are preferred to secure the highest strength.

(6) The initial curing condition or season of year had no appreciable effect on the absorption of the block; the average absorption was 5.8%.

*Abstracted from report presented by Committee P-6, Concrete Products Plant Operation, at American Concrete Institute 1927 Convention.

Bituminous Sands of Alberta

THE Canadian Department of Mines issues many excellent publications, beautifully printed and bound. One of the best that has been issued recently is a report, "The Bituminous Sands of Northern Alberta," which is in a 240-page volume accompanied by a case of well printed maps. The latter part of the book is devoted to the uses of bituminous sands in paving (rock asphalt).

Foreign Abstracts and Patent Review

Calcination of Limestone in Electric Furnace. According to this invention, calcium carbonate is ground to a degree of fineness which will permit the grains thus produced passing through a 40 or more per sq. in. mesh sieve, and then subjecting the granular material to heat, such as passing it through an electric furnace capable of attaining a temperature of between 700 deg. C. and 900 deg. C. for a period of time to produce pure CaO, such furnace being controlled to attain the desired temperature, and neither more or less, so as to prevent overburning or underburning. It is preferred also to agitate the contents of the furnace in any suitable way during the burning process. During the burning of the mass an accelerating action is brought about by the admittance of oxygen or steam, or both, or other suitable oxygen-containing agent, such agent being controlled to pass through the mass of granulated limestone to convert the calcium carbonate into calcium oxide. $CaCO_3$ (calcium carbonate) treated in the manner described readily expels the CO_2 (carbon dioxide), and the resultant product is characterized by rapid slaking which occurs immediately water is added to it (through the chemical purity of the product and its full state of granulation), and when applied to the uses for which lime is adapted the initial setting is considerably more rapid than the existing limes, and, further, by burning in an electric furnace the product is not impregnated with deleterious matter, such as sulphur, thus a lime produced by the improved process is chemically pure CaO (calcium oxide) and dries a pure white. *J. K. Kiddle, Melbourne, Australia, British Patent No.* 256,687.

Colloidal Silica—Its Utilization in Cements and Cement Mortars. A patent was taken out in Germany by H. Hinze covering a process of manufacture of cement and cement mortar from the by-products of the aluminum sulphate industry. The residue, insoluble in water, was mixed with lime to form cement and cement mortar without calcination of either constituent.

Further tests were made by the Materials Testing Laboratory in Zurich, which were published in the report of this laboratory of 1897. It was found that a chemical reaction took place in the presence of soluble silica in cement, which produced tremendous increase in strength.

Researches by Le Chatelier, Hauenschild, Erdmenger, etc., leave no doubt that the increased activity of cement in the presence of soluble silica is due to the formation of an initially colloidal lime hydrosilcate. The transition period from a colloidal to a solid stage is marked by a temporary drop in strength, as confirmed by numerous tests. This drop, noticeable at 7 days, is entirely obliterated after 28 days water curing, when the strength values of cement with admixtures of soluble silica are considerably higher than those of ordinary cement. It is important to secure thorough mixing of particles and to use only that quantity of water which produces saturated colloidal lime silicate. Free lime in portland cement and soluble silica in the admixture are the fundamental items in the mixing process.

A report of tests with soluble silica added in large percentages (up to 1/3) was published by Bach. These tests were made in 1900 and 1904 at the State Testing Laboratory in Berlin-Grosslichterfelde. A beneficial effect on strength was noted.

In 1908-1909 tests were made by the Chemical Laboratory of the Clay Industry in Berlin. The residues used as admixtures contained 36.30% soluble silica and were by-products of the aluminum sulphate industry. These were added to lime and cement, mixed to a pasty consistency, cured in air and water, and tested at the ages of 7, 28 and 90 days for tension and compression. The tests showed an increase in strength for lime as well as cement mortar. The favorable proportions for lime were: 25% lime and 75% residue; those for portland cement: 25% residue, 75% cement. In accordance with earlier test evidence, a temporary drop in strength becomes manifest in cement. The water-cured specimens soon show a more rapid rise and their values exceed those of cement without admixture at 28 days. At 90 days this advantage becomes considerable. The above applies only to water-cured specimens.—*Tonindustrie-Zeitung* (1927) **15**, 223-225.

Refractory Cement. A mixture of 1 to 10 parts of dry, pulverized bauxite and two parts of cement which contains not more than 30% clay. *German Patent No.* 438,264.

Determination of CO_2 in Carbonates. From 0.15 to 0.13 g. of calcium carbonate or other carbonate is weighed into a small beaker or test tube. The material is covered with distilled water and transferred to a filtration flask containing 50 cc. of $N/10$ barium oxide solution. A separatory funnel containing $3N$ HCl is placed over the flask and the whole apparatus made tight, after which the air within the flask is exhausted until a pressure of 20 m. Hg. is arrived at. The exhaust pump is then shut off and the hydrochloric acid fed slowly into the flask. The CO_2 gas on evolution is absorbed by the barium oxide solution and after evolution has ceased the contents are set aside for 12 to 24 hours. The unconverted barium oxide is titrated with $N/10$ oxalic acid from which the amount of CO_2 absorbed can be calculated. Results within 0.5% of theoretical are said to be possible by this method. *Analyst* (1926), **51**, 622-24.

Effect of the Calcination Process on the Properties of Portland Cement. A thorough review of all investigations of this subject are given. The different compounds in the three-component system of lime-silica-alumina are discussed. The history of the discovery of alite, belite, celite and felite crystals is given. Upon discovering that alite was most important to the hydraulic properties of cement, considerable research has been repeatedly made on this compound. Meyer, Tschernobaeff, Dittler and Jesser made the first investigations of this mineral. In more recent times extensive investigations were made by Nacken and Dyckerhoff. Their fundamental procedure was that of heating mixes to 1500 deg. C. and determining the binary and ternary compounds and their formation. The thermo-chemical effect was studied and confirmed by thermo-analyses of the formation of clinker from samples of the raw mix obtained from different plants. Whenever possible, microscopic studies were made to identify the compounds thus found in the clinker.

The following compounds were found in the portland cement clinker: $2CaO{\cdot}SiO_2$; $3CaO \cdot SiO_2$; $CaO \cdot Al_2O_3$; $3CaO \cdot Al_2O_3$; $5CaO{\cdot}3Al_2O_3$ and $8CaO{\cdot}2SiO_2{\cdot}Al_2O_3$.

The existence of $3CaO{\cdot}SiO_2$ and $8CaO{\cdot}2SiO_2Al_2O_3$ were definitely proven. The properties of all compounds were carefully studied, particularly the three forms of $2CaO{\cdot}SiO_2$, which received special attention. Formation of these compounds begins at 1050 deg. C. and increases rapidly with pronounced exothermic reaction between 1100 and 1200 deg. C. The heat curves of different synthetic and raw mixes were also platted, and the gradual formation of the different crystal compounds determined exactly. Microscopic investigation of synthetic clinker (Al_2O_3, CaO, and SiO_2) sintered for 20 min. at 1500 deg. C. show it to have the following composition: about 60% $2CaO{\cdot}SiO_2$ (chiefly in β form); $3CaO{\cdot}Al_2O_3$; $5CaO{\cdot}3Al_2O_3$, and a little free lime. Nacken and Dyckerhoff are of the opinion that the alite (β-$2CaO{\cdot}SiO_2$) is in solid solution with about 10% of CaO, although its optical properties show but little variation.

This theory found strong contradiction in Kuhl's researches, who maintained that assuming $2CaO{\cdot}SiO_2$ to be in solid solution with 10% lime in the presence of aluminates of highest lime content, there would still remain 10% CaO, which would presumably exist free in all portland cement clinkers. This is true, however, of only unsound clinkers and is not always present even in these. Kuhl also claimed that a modification of the dicalcium silicate was more probable. He also doubted the existence of free aluminates in the clinkers, as they

crystallize readily, yet no such crystals were observed in the clinker. Kuhl's tests also indicated higher temperatures—1340 to 1350 deg. C.—at which normal time of set, normal color, strength and soundness could be expected of the clinker. He also differed from the other investigators on the determination of alite, claiming that the optical tests of the compound were not able to definitely isolate it.

Biehl made a study of the effect of calcination temperature, period of calcination and speed of cooling on the hardening properties and crystalline formation of clinkers. He concluded that longer calcination and higher temperatures improve the quality of portland cement similar to fusion. *E. Ullrich, Zement* (1927), 72-74, 91-94.

Properties of Supercements. J. F. Goddard describes a super cement prepared by grinding "Catacoll" (gypsum treated with tannic acid) with portland cement clinker. The Catacoll replaces all or part of the raw gypsum added at this point. This cement was used by the British government in the construction of fuel oil and gasoline storage tanks. Catacoll has no cementitious value nor is it a water repellant, but the tannic acid in it seems to assist the reaction between the mixing water and the cement. There was a great increase in the number of hydrated particles of super cement as compared with portland cement at the end of 30 days and to this its waterproofing qualities are attributed. *Canadian Engineer* (1926), 51, 710-12.

Recent Process Patents

The following brief abstracts are of current process patents issued by the U. S. Patent Office, Washington, D. C. Complete copies may be obtained by sending 10c to the Superintendent of Documents, Government Printing Office, Washington, for each patent desired.

Manufacture of Terrazo Tile. Porous chips of bonded abrasive grain are moistened with water and mixed with dry cement, after which they are molded and shaped into tile. The tile surface is then ground to provide plane surfaces on the exposed chips. *George N. Jeppson and C. L. Leafe, U. S. Patent No.* 1,619,734.

Molded Mica Compositions. Mica fragments are coated with resinous compounds and formed into blanks which are heated under pressure at temperature sufficient to partially polymerize the resins. The blanks are cut to desired form and the formed product further heated to complete the polymerization of the resins. *L. E. Barringer and C. F. Peterson, U. S. Patent No.* 1,619,692.

Oxychloride Cement. A cement comprising MgO, 1% of a mixture of 75 parts mineral oil and 25 parts of beef fat, and from 15% to 25% of $MgCl_2$. *H. M. Olson, U. S. Patent No.* 1,619,534.

Concentrating Carbon Dioxide. The CO_2 gas present in kiln gas mixtures containing CO_2 is absorbed in Na_2CO_3 liquor with the formation of $NaHCO_3$. The solid $NaHCO_3$ is separated from the liquor by centrifuging and upon heating yields CO_2 gas in concentrated form. *Viggo Drewsen, U. S. Patent No.* 1,619,336.

Cement Mixture. Sufficient calcium chloride is dissolved in water to form a solution of 1.0016 sp. gr. and then cement and sawdust in desired proportions are added to make a cement mixture. *F. H. Christiansen, U. S. Patent No.* 1,618,512.

Grinding Gypsum and Cement. Pulverized raw gypsum is added to cement or clinker and both ground in a mill which is kept at temperatures sufficiently low to prevent the conversion of the gypsum to plaster of paris. *Carl Pontoppidan, U. S. Patent No.* 1,618,295.

Closed Circuit Grinding. The process of reduction of finely divided material which consists in grinding material in a grinding unit, removing the fines from the grinding unit by means of a current of fresh air of low velocity and large volume before all the material has been ground to its finest condition therein, passing the fines through a settling chamber and returning to the grinding unit the oversized particles and passing the sized particles through an air filter without the return of the air used as the conveying medium to the grinding unit. *William Gardner, U.S. Patent No.* 1,619,295.

Aggregate-Cement Tile. Precast cement body whose top surface consists of embedded colored aggregates such as porcelains, marble and other materials. The surface is ground or polished and made sufficiently dense so as to be substantially resistive to water penetration. *George N. Jeppson, U. S. Patent No.* 1,619,733.

Cellular Gypsum Products. Lightweight cellular gypsum products, substantially non-efflorescent and of homogeneous cellular texture are made by gauging with water a mixture of plaster of paris, sodium bicarbonate, water soluble acid salt such as aluminum sulphate, soap bark and dextrinized starch. A preferable mixture is as follows:

Plaster of paris	100 parts
Aluminum sulphate	3 to 6 parts
Granular sodium bicarbonate	0.45 to 2.8 parts
Dextrinized starch (HHH gum)	About 0.2 parts
Soap bark	0.05 to 0.1 part

to which may be added if desired fine silica sand or pulverized quartz—10 parts.

The degree of porosity can be controlled by varying the proportions of the materials, particularly the amounts of aluminum sulphate, sodium bicarbonate and soap bark. Volumes varying as much as 100% have been produced in this way.

The preferred form of sodium bicarbonate is the granular, for it distributes evenly through the mass both in the dry mix and the mortar, nor does it float on the surface of the water and react there. Thus practically all the gas evolved from the material is used to uniformly expand the mass without an after-rise, by which it is possible to cast regular and even surfaces without leveling or screeding the mortar. Powdered soap bark is the preferable gas entangling agent because of the relatively small amount needed to act efficiently as a foam stabilizer and to expedite rapid and satisfactory drying of the mortar after pouring. The soap bark goes into solution readily and collects in the film or envelopes the surrounded gas bubbles and in this way increases the viscosity of the film-forming liquid constituting the bubble wall, thereby making these walls less liable to rupture, thus decreasing the amount of gas lost from the mass.

The small amount of dextrinized starch used in the mixture serves to impart strength and tenacity to the foaming mass or mortar and to prevent efflorescence in the gauged mixture. Aluminum sulphate is used to assist in liberating the CO_2 gas from the granular sodium bicarbonate. Some of the gas is set free during the gauging period by the action of the sodium bicarbonate on the gypsum.

The mixture as described may be marketed in a dry form and gauged on the job or cast directly into slabs or blocks.

Under some conditions, particularly where the gypsum is of the sticky variety, it is desirable to use an inert aggregate such as fine sand. The sand is used in preference to other materials, such as coke, cinders, charcoal, etc., for a more thorough mix can be assured when the dry ingredients are gauged with water. Further, the sand breaks up any lumps present in the dry mix and allows water to diffuse equally and rapidly throughout the mass, thus facilitating the production of a uniformly porous product. For extra-light units the sand is omitted.

The patent proportions are not limited to the amounts stated as preferable nor are the ingredients, several substitutions being included in the specifications. The weight of the product so made is given as not more than 30 lb. per cu. ft. *H. E. Brookby and G. D. King* (assignors to U. S. Gypsum Co.) *U. S. Patent No.* 1,620,067.

Artificial Stone. Composition of 30 parts fine clay, 30 parts silica, 30 parts sulphur, 5 parts talc and 5 parts plumbago. *O. A. Tanner, U. S. Patent No.* 1,617,927.

Method of Making Plaster Board. Plastic material is advanced between surface sheets to form the board, the board is then advanced to a desired length, a uniform pull being applied to the free edge of the board. The board is pulled over a surface in a lower plane, the plane of the pull being maintained at a spaced distance from the board surface. The board is then cut and dropped upon the surface. Unretarded paper is used as backing and the method of handling is designed to make its use efficient, buckling of the board and scuffing of the paper being eliminated. *J. F. Makowski, U. S. Patent No.* 1,600,500.

Report of Ballast Committee of American Railway Engineering Association

AT the recent annual convention of the American Railway Engineering Association at Chicago, the ballast committee, of which J. G. Bloom is chairman, reported as follows:

"Your committee respectfully presents the following recommendations:

Action Recommended

"1. That the change in the 'Manual' in Appendix A be approved, and the additional test be inserted in the 'Manual' as Test No. 4 under 'Specifications for Washed Gravel Ballast.'

"2. That the report on relative value of stone as ballast from various quarries be received as information.

"3. That the subject of effect on operating expenses of various kinds of ballast be continued for further study.

"4. That the report on shrinkage of ballast be received as information.

"5. That the report on cause of pumping joints be received as information.

Recommendations for Future Work

"1. Revision of 'Manual.'

"2. Continue study of relative value, from the standpoint of effect on operating expenses, of various kinds of ballast."

Appendix A—(1) Revision of Manual

"The committee proposes the following be added to the 'Specifications for Washed Gravel Ballast," which were adopted at the 1926 convention:

Test No. 4—Proportion of Aggregates in Washed, Crushed and Screened Gravel. A sample of the prepared ballast weighing not less than 150 lb. shall be thoroughly dried, weighed and placed on a screen having holes 1½ in. in diameter; all material which can be passed through this screen shall be placed upon a screen having holes 1 in. in diameter; all material which can be passed through this screen shall be placed upon a screen having holes ½ in. in diameter; all material which can be passed through this screen shall be placed upon a screen having meshes of ¼ in., and all material which can be passed through this screen shall be placed upon a No. 10 screen, and all material which can be, shall be passed through it.

"If the ratio of the amount of material retained on the 1½-in. screen to the amount of the sample as a whole exceeds 2%, the product shall be rejected until the fault has been corrected.

"If the ratio of the amount of material passing the No. 10 screen to the amount of samples as a whole exceeds 3% the product shall be rejected until the fault has been corrected.

"If the ratio of the amount of material retained on each of the screens to the amount of the sample as a whole does not come within the tolerances given above, the material shall be rejected until the fault has been corrected.

Conclusion

"1. It is recommended that the foregoing test be added to the 'Specifications for Washed Gravel Ballast,' adopted at the 1926 convention."

Appendix B—(2) Relative Value of Stone as Ballast From Various Quarries; Method of Determining

"The committee feels that at present there is not enough data, on ballast of proven merit, to establish any equating coefficients or other arbitrary values whereby one ballast may be given a higher numerical index than another.

"To establish a standard as to absorption, hardness, toughness and wear would require a large number of tests of ballast of proven merit. Such a standard would seldom be of service, as the choice between usable materials is usually limited by length of haul, and totally unfit sources have been eliminated by experience.

"We are therefore of the opinion that the benefits to be derived will not justify the expenditure necessary to make sufficient tests to obtain data upon which to base conclusions on the topic assigned."

Appendix C—(3) Relative Value, From Standpoint of Effect on Operating Expenses, of Various Kinds of Ballast

"The subject of the effect of various kinds of ballast on operating costs is very much involved. The matter has been discussed in a general way with the entire committee, and it is the recommendation that the subject be continued for further study."

Appendix D—(4) Shrinkage of Ballast

"At the March, 1924, convention, the ballast committee reported to the association certain recommendations for adoption and insertion in the 'Manual,' as shown on page 6 of Bulletin 267, Supplement to the 'Manual.'

"With a view of determining to what extent, if any, this information as outlined above was being used by members of the association, a questionnaire was prepared and sent to members of the association. The questions and answers are as follows:

"1. *Is ballast purchased by the cubic yard or by weight?*

"(A) Forty reply by weight; 14 by the cubic yard; 11 by both weight and cubic yard.

"2. *If purchased by weight, it is computed as placed in track by weight or by cubic yard?*

"(A) Fifteen reply by weight; 44 by cubic yard.

"3. *How is the total yardage of ballast used determined on completed work?*

"(A) Forty-six reply by using amount purchased; 4 by measurement.

"4. *What percentage of shrinkage is allowed for each kind of ballast used as between ballast in place and ballast at place of origin?*

"(A) Sixty-four replies received to this question; 13 report a percentage of shrinkage on certain ballast:

Stone ballast	9.3 %
Slag ballast	14 %
Washed gravel ballast	14½%
Pit run gravel ballast	13¾%
Cinder ballast	20 %
Burnt clay ballast	16¼%
Chatts ballast	10 %
Oyster shell ballast	7½%

Conclusion

"1. In view of the fact that no information has been received which is in conflict with the matter now in the 'Manual' at the present time, the committee recommends that the subject be discontinued."

Appendix E—(5) Cause of Pumping Joints

"Your committee submits the following report as to cause of pumping joints and the remedy therefor:

"First—Water pockets in roadbed so located as to hold water close to the surface of the ground.

"Second—Foul ballast, either from mud and water working up from underneath, or dirt allowed to fall on the ballast from the top in ditching or other work.

"Third—Creeping rail and battered joints, either moving the joint ties, or hammering them down.

"The only remedy for the first cause is removal of the water pockets. This can be done by ribbing with rock where the trouble is on fills, or laying drain tile where it is in cuts, using parallel drains and laterals where needed. If drain tile is laid, it will be necessary to clean out all of the old ballast that has become foul, and substitute new material.

"Where the ballast has become foul so as to hold the surface water it will be necessary to clean out the old ballast and raise the track on fresh material.

"Where the joint ties are spiked in slots on rail joints, and the rail creeps, it will, of course, move the joints from their original bed, and this will soon cause the joint ties to start moving, which action will pump the water from underneath the ballast to the surface, causing sloppy track, and where the rail has bad joints from loose bolts or lipped rail, it will have the same effect. This can be remedied by properly anchoring the track with anti-rail creepers and removing the defective rail, being careful to see that all bolts are tight at all times.

Conclusion

"1. The committee recommends that the subject of cause of pumping joints be discontinued."

Southern California Rock Products Association Elects Officers

ON March 3 the Southern California Rock Products Association held its second annual meeting and elected the following officers: W. C. Hay, of the Blue Diamond Co., who succeeds C. B. Rogers, retiring president; F. F. Gay, of the Consumers Rock and Gravel Co., vice-president; Paul Graham, Graham Brothers, Inc., treasurer; E. Earl Glass, general manager. Directors are E. A. Neiger, Alhambra Transfer and Storage Co.; W. C. Hay, Blue Diamond Co.; E. G. Hotchkiss, Builders Crushed Rock Products Co.; F.F. Gay, Consumers Rock and Gravel Co.; Paul Graham, Graham Bros., Inc.; Peter Ferry, Haines Canyon Rock Co.; O. V. Barkman, Orange County Rock Co.; C. B. Rogers, Reliance Rock Co.; G. A. Rogers, Union Rock Co.

W. C. Hay

The annual report of the association, submitted by the chairman of standing committees, was a creditable compilation of association activities, that have been carried through the accomplishment. Mr. Hay's address of acceptance of leadership of the Southern California group was an inspiring appeal to the members to redouble their efforts for the improvement of the industry by the exercise of that individual integrity, which begets confidence and stability in the industry.

Los Angeles City Ordinance Restricts Opening New Pits

AFTER parties that had previously objected failed to continue their protests, the ordinance providing for strict regulation of rock crushers has been adopted by the Board of Supervisors of Los Angeles, Calif.

The ordinance provides that no crusher or rock quarry can be established anywhere within the county without express permission from the board.

According to Supervisor Graves, who backed its passage, the law is designed to keep rock companies from installing crushers in the vicinity of hospitals and quiet residential districts, which some of the firms have previously done, and to keep the same concerns from establishing quarries in river bottoms near bridge abutments or foundations.

Quarrying near bridges is a practice, some members of the board claim, which results in so many bridges going out at flood time. It is said the big holes dug in river beds are eaten back by the water and finally undermine the structures.

When the ordinance was originally put up for passage, representatives of many smaller rock-crushing companies protested and maintained the ordinance was designed to keep them down, while the firms with plants already established could continue as they were.

The board continued the passage for a few days at the request of the protestors, and when it was again put up there was no dissent.—*Los Angeles* (Calif.) *Express.*

New Kaw River Sand Plant a Public Enterprise

THE Kaw Valley Drainage Board, Kansas City, Kan., has started operation of a sand plant. The following account from the *Kansas City* (Kan.) *Kansan* contains some obvious discrepancies, which possibly are accounted for by the ignorance and inexperience of the builders and operators:

"The final construction work on the plant was done March 9. Tests for leaks were made the following day. The leaks found will be repaired next week, and after that test operations are scheduled to start.

"The plant is different from other sand pumps along the Kansas river because of its large pumping capacity and large tipple and dredge. When operation of the plant is in full sway, 1000 cu. yd. of pure sand can be pumped per day, it has been estimated.

"Construction of the plant marks the first step of the Kaw Valley Drainage Board in developing a project which promises financial assistance to flood protection work. The completion of the plant is one of the planks of the platform on which the present board members, Ed L. Mason, Charles Brenneisen and John Silvers, were elected.

"Work on the construction of the plant began early in January. It is on 9½ acres of land known as the Haskell tract, which was purchased by the drainage board.

"There is sand to a depth of 65 ft. beneath the dredge. A distance of one-half mile along the river is at the disposal of the plant.

"Tests of the sand found show that it is 19½% better for building purposes than sand found at any other point in the state. The plant which ranks next in the state in quality of sand pumped is located at Ellis.

"The plant consists of a dredge in the river, which scrapes the sand from the bed; a pipe line, through which the sand and water are pumped, and a tipple, in which the pure sand is separated from gravel and water.

"A 750-hp. motor will operate the plant. The pipe line is 16 in. in diameter, much larger than average used for such purposes.

"A powerful cutter on the dredge is able to move any obstruction in front of it. It operates by centrifugal force, suction created by rotary motion taking the sand up into the pipes.

"The sand, together with water and impurities found in the river bed, is pumped along the pipe line a distance of 1300 ft. to the tipple. In the tipple it flows over a screen, which separates the sand from gravel and impurities, the sand dropping in piles near the tipple and the impurities washing into a hole near by.

"Trucks will be used to haul away the sand from the piles as it dries. A road extending along Eighteenth street will be constructed soon to accommodate the trucks. At present there is a temporary road.

"Tentative plans have been made to secure a railroad switch to the point, in order that cars may be loaded as the sand is pumped. Completion of these plans is seen when the plant is in full operation.

"A tow-boat at the plant is in readiness to tow away logs which would interfere with the operation.

"Four men will be required to operate the plant. One man will be on the tipple and three at the dredge.

"The plant was constructed at a cost of about $10,000."

A subsequent report in the March 20 issue of the same newspaper states:

"Active operation of the Kaw Valley Drainage Board sand plant at the foot of South Eighteenth street will be begun this week, following a week of experimental operations.

"It was found early last week that mud interfered with the sand, causing a delay of several days while the dredge was being moved. Friday the plant was put to the first real test, and by evening several yards of sand had been pumped and were on a pile beneath the tipple."

It is our bet that the Kaw River Drainage Board has something yet to learn about making sand from Kaw River.—The Editor.

Canadian Tripoli Deposit Being Developed

THE Oxford Tripoli Sales Co., Inc., is establishing a new industry in North Colchester County, Nova Scotia, 17 miles from Trusro, for the purpose of working a deposit of infusorial earth, a material largely used by the rubber, drug and polishing trades. The plant consists of a main building, 72x25 ft., which contains boilers, engine, drying furnace and wood storage rooms; a rotary building 70 ft. long, containing a large rotary drying machine and a shed 40x20 ft. for storing raw material. The cylinder is on an incline and as it revolves the material is brought near the lower end where the furnace is located. As the earth comes in direct contact with the flame it is calcined. After being cooled it is shipped to the company's plant at Haverstraw, N. Y., for grinding and refining.

The Rock Products Market

Wholesale Prices of Crushed Stone

Prices given are per ton, F.O.B., at producing point or nearest shipping point

Crushed Limestone

City or shipping point	Screenings, ¼ inch down	½ inch and less	¾ inch and less	1½ inch and less	2½ inch and less	3 inch and larger
EASTERN:						
Buffalo, N. Y.	1.30	1.30	1.30	1.30	1.30	1.30
Chaumont, N. Y.	.50	1.75	1.75	1.50	1.50	1.50
Chazy, N. Y.	.75		1.60	1.30	1.30	1.30
Coldwater, N. Y.—Dolomite			1.50 all sizes			
Danbury, Conn.	2.25	2.25	2.00	1.75	1.50	
Dundas, Ont.	3.04	1.05	1.05	.90	.90	.90
Frederick, Md.	.50@ .75	1.20@1.30	1.15@1.25	1.10@1.15	1.10@1.15	1.05@1.10
Munns, N. Y.	1.00	1.50	1.50	1.40	1.25	1.25
Northern New Jersey	1.60	1.50@1.80	1.30@2.00	1.40@1.60	1.40@1.60	
Prospect, N. Y.	1.00	1.50	1.40	1.30	1.30	
Walford, Penn.	.70		1.35h			
Watertown, N. Y.	1.00		1.75	1.50	1.50	1.50
Western New York	.85	1.25	1.25	1.25	1.25	1.25
CENTRAL						
Alton, Ill.	1.85		1.85			
Bloomville. Middlepoint, Dunkirk, Bellevue, Waterville, No. Baltimore, Holland, Kenton, New Paris, Ohio; Monroe, Mich.; Huntington, Bluffton, Ind.	1.00	1.10	1.10	1.00	1.00	1.00
Buffalo, Iowa	1.10		1.50	1.30	1.35	1.35
Chasco, Ill.	1.00@1.30		1.00@1.15		1.00@1.15	
Columbia, Krause, Valmeyer, Ill.	1.10@1.50	1.10@1.25	1.20@1.35	1.10@1.35	1.10@1.35	‖1.25
Flux (Valmeyer)	1.10@1.50			1.75		1.75
Greencastle, Ind.	1.25	1.25	1.15	1.05	.95	.95
Lannon, Wis.	.80	1.00	1.00	.90	.90	.90
Linwood and Buffalo, Ia.	1.10		1.30	1.20	1.25	1.25
McCook, Ill.	1.00	1.25	1.25	1.25	1.25	1.25
River Rouge, Mich.	1.20	1.20	1.20	1.20	1.20	1.20
Milltown, Ind.		.90@1.00	1.00@1.10	.90@1.00	.85@ .90	.85@ .90
Montreal, Que.	.80	1.35	1.15	.90	.95	.95
Mt. Vernon, Ill.	1.10@1.20	1.00	1.00	1.00	1.00	
Sheboygan, Wis.	1.10	1.10	1.10	1.10	1.10	1.10
Toledo, Ohio	1.60	1.70	1.70	1.60	1.60	1.60
Toronto, Ont.	1.55	2.05	2.05	1.90	1.90	1.90
Stone City, Iowa	.75		†1.10	1.05	1.00	
Waukesha, Wis.	.90	.90	.90	.90	.90	.90
Wisconsin Points	.50		1.00	.90	.90	
SOUTHERN:						
Alderson, W. Va.	.50	1.45	1.35	1.30	1.25	1.20
Atlas, Ky.	.50	1.00	1.00	1.00	1.00	1.00
Brooksville, Fla.	.75		2.65	2.65	2.40	2.00
Cartersville, Ga.	1.50	1.50	1.80	1.35	1.15	1.15
Chico, Tex.	1.00	1.35	1.25	1.20	1.10	1.00
El Paso, Tex.	1.00	1.00	1.00	1.00		
Ft. Springs, W. Va.	.50	1.35	1.35	1.20	1.20	
Graystone, Ala.	.50		Crushed run, screened, $1 per ton			
Kendrick and Santos, Fla.			3½ in. and less, 1.00 per ton			
Ladds, Ga.			1.50	1.35	1.15	
New Braunfels, Tex.	.60	1.25	1.10	.90	.90	.90
Rocky Point, Va.	.50@ .75	1.40@1.60	1.30@1.40	1.15@1.35	1.10@1.20	1.00@1.05
WESTERN:						
Atchison, Kans.	.25	1.90	1.90	1.90	1.90	1.80
Blue Springs & Wymore, Neb.	.25	1.45	1.45	1.35c	1.25d	1.20
Kansas City, Mo.	1.00	1.60	1.60	1.60	1.60	1.60
Cape Girardeau, Mo.	1.25	1.25	1.25	1.25	1.00	

Crushed Trap Rock

City or shipping point	Screenings, ¼ inch down	½ inch and less	¾ inch and less	1½ inch and less	2½ inch and less	3 inch and larger
Branford, Conn.	.80	1.70	1.45			
Duluth, Minn.	.90	2.25	1.90	1.50	1.35	1.35
Dwight, Calif.	1.00	1.00	1.00	.90	.90	
Eastern Maryland	1.00	1.60	1.60	1.50	1.35	1.35
Eastern Massachusetts	.85	1.75	1.75	1.25	1.25	1.25
Eastern New York	.75	1.25	1.25	1.25	1.25	1.25
Eastern Pennsylvania	1.10	1.70	1.60	1.50	1.35	1.35
Knippa, Tex.	2.50	2.00	1.55	1.35	1.25	
New Haven, New Britain, Meriden and Wallingford, Conn.	.80	1.70	1.45	1.20	1.05	
Northern New Jersey	1.50e	2.10	1.90	1.50	1.50	
Oakland and El Cerito, Cal.	1.00	1.00	1.00	.90	.90	
Richmond, Calif.	.75		1.00	1.00	1.00	
San Diego, Calif.		2.75	2.55	2.35	2.35	
Springfield, N. J.	2.00	2.00	2.10	1.70	1.70	
Toronto, Ont.		3.58@4.05	3.05@3.80			
Westfield, Mass.	.60	1.50	1.35	1.20	1.10	1.10

Miscellaneous Crushed Stone

City or shipping point	Screenings, ¼ inch down	½ inch and less	¾ inch and less	1½ inch and less	2½ inch and less	3 inch and larger
Berlin, Utley, Montello and Red Granite, Wis.—Granite	1.80	1.70	1.50	1.40	1.40	
Cayce, S. C.		2.00	1.75	1.75	1.60	
Eastern, Penn.—Sandstone	1.35	1.70	1.65	1.40	1.40	1.40
Eastern Penn.—Quartzite	1.20	1.35	1.25	1.20	1.20	1.20
Emathla, Fla.		Crushed flint rock, 2.50 per cu. yd.				
Lithonia, Ga.	.75a	2.00b	1.75	1.40	1.35	1.25
Lohrville, Wis.—Granite	1.65	1.70	1.65	1.45	1.50	
Middlebrook, Mo.	3.00@3.50		2.00@2.25	2.00@2.25		1.25@3.00
Richmond, Calif.—Quartzite	.75		1.00	1.00	1.00	
Somerset, Penn. (sand-rock)			1.50 to 1.85			
Toccoa, Ga. (Granite)		1.50	1.40	1.30	1.25	1.25

*Cubic yd. †1 in. and less. ‡Two grades. ‖Rip rap per ton. (a) Sand. (b) to ⅝ in. (c) 1 in., 1.40. (d) 2 in., 1.30 (e) Dust. (f) ¼ in. (h) less 10c discount. (i) 1 in., 1.40.

Agricultural Limestone
(Pulverized)

Alderson, W. Va.—Analysis, 90% $CaCO_3$; 50% thru 50 mesh	1.50
Alton, Ill.—Analysis 99% $CaCO_3$, 0.3% $MgCO_3$; 90% thru 100 mesh	5.00
Asheville, N. C.—Analysis, 57% $CaCO_3$, 39% $MgCO_3$; 50% thru 100 mesh; 200-lb. burlap bag, 4.00; bulk	2.75
Atlas, Ky.—90% thru 100 mesh	2.00
50% thru 100 mesh	1.00
Bettendorf and Moline, Ill—Analysis, $CaCO_3$, 97%; 2% $MgCO_3$; 50% thru 100 mesh, 1.50; 50% thru 4 mesh	1.50
Blackwater, Mo.—100% thru 4 mesh	1.00
Branchton and Osborne, Penn.—100% thru 20 mesh; 60% thru 100 mesh; 45% thru 200 mesh. (Less 50 cents commission to dealers)	5.00
Cape Girardeau, Mo.—90% thru 50 mesh	1.50
Charleston, W. Va.—Marl, per ton, bulk	3.00
Chaumont, N. Y.—Pulverized limestone, bags, 4.00; bulk	2.50
Chico, Tex.—50% thru 50 mesh, 1.75; 50% thru 100 mesh	2.25
Colton, Calif.—Analysis 90% $CaCO_3$, bulk	4.00
Cypress, Ill.—90% thru 100 mesh	1.35
Ft. Springs, W. Va.—50% thru 4 mesh	1.50
Hillsville, Penn.—Analysis, 94% $CaCO_3$, 1.40% $MgCO_3$; 75% thru 100 mesh; sacked	5.00
Hot Springs and Greensboro, N. C.—Analysis, $CaCO_3$, 98-99%; $MgCO_3$, 42%; pulverized; 67% thru 200 mesh, bags	3.95
Bulk	2.70
(Paving dust)—80% thru 200 mesh, bags	4.25@ 4.75
Bulk	3.00@ 3.50
Jamesville, N. Y.—Analysis, 89.25% $CaCO_3$; 5.25% $MgCO_3$; pulverized, bags, 4.25; bulk	2.75
Joliet, Ill.—90% thru 100-mesh	4.25
Knoxville, Tenn.—80% thru 100 mesh, bags, 3.95; bulk	2.70
80% thru 200 mesh, bags, 4.25; bulk	3.00
Ladds, Ga.—Analysis, $CaCO_3$, 58%; $MgCO_3$, 32%; pulverized; 50% thru 50 mesh	1.50
Marblehead, Ohio—Analysis, 83.54% $CaCO_3$, 14.92% $MgCO_3$; 60% thru 100 mesh; 70% thru 50 mesh; 100% thru 10 mesh; 80 lb. paper sacks, 5.00; bulk	3.50
Marlbrook, Va.—Marl, per ton, bulk	2.25
Marion, Va.—Analysis, 90% $CaCO_3$, pulverized, per ton	2.00
Middlebury, Vt.—$CaCO_3$, 99.05%; 50% thru 200 mesh; sacked	5.50
Milltown, Ind.—Analysis, 94.50% $CaCO_3$, 33% thru 50 mesh, 40% thru 50 mesh; bulk	1.35@ 1.60
Olive Hill, Ky.—90% thru 4 mesh	1.00
Piqua, Ohio—Total neutralizing power 95.3%; 99% thru 10, 60% thru 50; 50% thru 100	2.50@ 2.75
100% thru 10, 90% thru 50, 80% thru 100; bags, 5.10; bulk	3.60
99% thru 100, 85% thru 200; bags, 7.00; bulk	5.50
Rocky Point, Va.—Analysis, $CaCO_3$, 95%; 50% thru 200 mesh, burlap bags, 3.50; paper, 3.25; bulk	2.00
Syracuse, N. Y.—Analysis, 89% $CaCO_3$; $MgCO_3$, 4%; bags, 4.25; bulk	2.75
Toledo, Ohio, 30% through 50 mesh	2.25
Waukesha, Wis.—90% thru 100 mesh, 4.50; 50% thru 100 mesh	2.30
Watertown, N. Y.—Analysis, 96-99% $CaCO_3$; 50% thru 100 mesh; bags, 4.00; bulk	2.50
West Stockbridge, Mass.—Analysis 90% $CaCO_3$, 50% thru 100 mesh; cloth bags, 4.75; paper, 4.25; bulk	3.25

Agricultural Limestone
(Crushed)

Alton, Ill.—Analysis 99% $CaCO_3$, 0.3% $MgCO_3$: 50% thru 4 mesh	3.00
Atlas, Ky.—90% thru 4 mesh	1.00
Bedford, Ind.—Analysis, 98.5% $CaCO_3$, 0.5% $MgCO_3$: 90% thru 10 mesh; 25% thru 100 mesh; 50% thru 50 mesh	1.50
Brandon and Middlebury, Vt.—Pulverized, bags, 5.50; bulk	[illegible]

(Continued on next page.)

Agricultural Limestone

Bridgeport and Chico, Texas—Analysis, 94% $CaCO_3$, 2% $MgCO_3$; 100% thru 10 mesh	1.75
50% thru 4 mesh	1.50
Chicago, Ill.—50% thru 100 mesh; 90% thru 4 mesh	.80
Columbia, Krause. Valmeyer, Ill.—Analysis, 90% $CaCO_3$; 100% thru 4 mesh	1.10@ 1.50
Cypress, Ill.—90% thru 50 mesh, 50% thru 100 mesh, 90% thru 50 mesh, 90% thru 4 mesh, 50% thru 4 mesh	1.35
Danbury, Conn.—Analysis, 79% $CaCO_3$, 11% $MgCO_3$; 60% thru 100 mesh; 80% thru 50 mesh; 100% thru 4 mesh; bags, 4.25; bulk	3.25
Dundas, Ont.—Analysis, 54% $CaCO_3$; $MgCO_3$, 43%; 50% thru 50 mesh	1.00
Ft. Springs, W. Va.—Analysis, 90% $CaCO_3$; 90% thru 50 mesh	1.50
Kansas City, Mo.—50% thru 100 mesh	1.00
Lannon, Wis.—Analysis, 54% $CaCO_3$, 44% $MgCO_3$; 99% through 10 mesh; 46% through 60 mesh	2.00
Screenings (¼ in. to dust)	1.00
Marblehead, Ohio.—Analysis, 83.54% $CaCO_3$, 14.92% $MgCO_3$, 32% thru 100 mesh; 51% thru 50 mesh; 83% thru 10 mesh; 100% thru 4 mesh (meal) bulk	1.60
Mayville, Wis.—Analysis, 54% $CaCO_3$, 44% $MgCO_3$; 50% thru 50 mesh	1.85@ 2.35
McCook, Ill.—90% thru 4 mesh	.90
Middlepoint, Bellevue, Kenton, Ohio; Monroe, Mich.; Huntington and Bluffton, Ind.—Analysis, 42% $CaCO_3$, 54% $MgCo_3$; meal, 100% thru 4 mesh; 20% thru 100 mesh	1.50
Moline, Ill., and Bettendorf, Iowa—Analysis, 97% $CaCO_3$, 2% $MgCO_3$; 50% thru 100 mesh; 50% thru 4 mesh	1.50
Mountville, Va.—Analysis, 62.54% $CaCO_3$; $MgCO_3$, 35.94%, 100% thru 20 mesh; 50% thru 100 mesh bags	5.50
Pixley, Mo.—Analysis, 96% $CaCO_3$; 50% thru 50 mesh	1.25
50% thru 100 mesh; 90% thru 50 mesh; 50% thru 50 mesh; 90% thru 4 mesh; 50% thru 4 mesh	1.65
River Rouge, Mich.—Analysis, 54% $CaCO_3$, 40% $MgCO_3$; bulk	.80@ 1.40
Stone City, Iowa.—Analysis, 98% $CaCO_3$; 50% thru 50 mesh	.75
Tulsa, Okla.—Analysis $CaCO_3$, 86.15%, 1.25% $MgCO_3$, all sizes	1.25

Pulverized Limestone for Coal Operators

Hillsville, Penn., sacks, 4.50; bulk	3.00
Joliet, Ill.—Analysis, 48% $CaCO_3$; 42% $MgCO_3$; 90% thru 200 mesh; (for mine dusting and asphalt filler)	3.50
Piqua, Ohio, sacks, 4.50@5.00 bulk	3.00@ 3.50
Rocky Point, Va.—82% thru 200 mesh, 2.50@3.50 bulk, paper bags	3.75@ 4.75
Waukesha, Wis.—90% thru 100 mesh, bulk	4.50

Glass Sand

Silica sand is quoted washed, dried and screened unless otherwise stated. Prices per ton f.o.b. producing plant.

Berkeley Springs, W. Va	2.00@ 2.25
Buffalo, N. Y.	2.00@ 2.50
Cedarville and S. Vineland, N. J.—Damp	1.75
Dry	2.25
Columbus, Ohio	1.00@ 1.50
Estill Springs and Sewanee, Tenn.	1.50
Gray Summit and Klondike, Mo.	1.75@ 2.00
Los Angeles, Calif.—Washed	5.00
Mapleton Depot, Penn.	2.00@ 2.25
Massillon, Ohio	3.00
Mendota, Va.	2.25@ 2.50
Michigan City, Ind.	.35
Mineral Ridge and Ohlton, Ohio	2.50
Oceanside, Calif.	3.00
Pittsburgh, Penn.	3.00@ 4.00
Ridgway, Penn.	2.50
Rockwood, Mich.	2.75@ 3.25
Round Top, Md.	2.00
San Francisco, Calif.	4.00@ 5.00
Silica, Va.	2.50
St. Louis, Mo.	2.00
Sewanee, Tenn.	1.50
Thayers, Penn.	2.50
Utica and Ottawa, Ill.	.90@ 1.15
Warwick, Ohio (green)	1.75
Zanesville, Ohio	2.50

Miscellaneous Sands

City or shipping point	Roofing sand	Traction
Beach City, Ohio	....	1.75
Columbus, Ohio	....	.30@ 1.50
Dresden, Ohio	....	1.25
Eau Claire, Wis.	3.25	1.00
Estill Springs and Sewanee, Tenn.	1.35@ 1.50	1.35@ 1.50

(Continued on next page)

Wholesale Prices of Sand and Gravel

Prices given are per ton, F.O.B., producing plant or nearest shipping point

Washed Sand and Gravel

City or shipping point	Fine Sand, 1/10 in. down	Sand, ¼ in. and less	Gravel, ½ in. and less	Gravel, 1 in. and less	Gravel, 1½ in. and less	Gravel, 2 in. and less
EASTERN:						
Ambridge & So. H'g'ts, Penn.	1.25	1.25	1.15	.85	.85	.85
Attica and Franklinville, N. Y.	.75	.75	.75	.75	.75	.75
Boston, Mass.‡	1.40	1.40	2.25	....	2.25	2.25
Erie, Pa.	....	1.00*	....	1.50*	1.75*	....
Farmingdale, N. J.	.58	.48	.85	1.20	1.15	....
Hartford, Conn.	.65*	....	....	....	....	....
Leeds Junction, Me.	....	.50	1.75	....	1.35	1.25
Machias Jct., N. Y.	.75	.75	.85	.75	.75	.75
Montoursville, Penn.	1.00	.90	1.00	.85	.85	.80
Portland, Me.	....	1.00	2.25	....	2.00	....
Shining Point, Penn.	....	....	1.00	1.00	1.00	1.00
Somerset, Penn.	....	2.00	....	....	....	....
South Heights, Penn.	1.25	1.25	.85	.85	.85	.85
Washington, D. C.	.60@ .85	.60@ .85	1.70	1.50	1.30	1.30
York, Penn.	1.10	1.00	....	....	....	....
CENTRAL:						
Aurora, Ill.	....	.40@ .50	.40	.50	.70	.70
Algonquin and Beloit, Wis.	.50	.40	.60	.60	.60	.60
Appleton and Mankato, Minn.	....	.45	1.25	1.25	1.25	1.25
Attica, Ind.			All sizes .75@.85			
Barton, Wis. (f)	....	.50	....	.75	.75	.75
Chicago district, Ill.	.70	.55	.55	.60	.60	.60
Columbus, Ohio	....	.85	.85	.85	.85	....
Des Moines, Iowa	.40	.40	1.40	1.40	1.40	1.40
Eau Claire and Chippewa Falls, Wis.	.40	.40	.80	.90	.90	....
Elkhart Lake, Wis.	.40	.40	.56	.56	.50	.50
Ferrysburg, Mich.	....	.50@ .80	.60@1.00	.60@1.00	....	.50@1.25
Ft. Dodge, Iowa	.85	.85	2.05	2.05	2.05	2.05
Grand Haven, Mich.	....	.60@ .70	....	.70@ .90	....	.70@ .90
Grand Rapids, Mich.	....	.50	....	.80	.80	.70
Hamilton, Ohio	....	1.00	1.00	1.00	1.00	1.00
Hersey, Mich.	....	.50	....	....	....	.70
Humboldt, Iowa	.50	.50	1.50	1.50	1.50	1.50
Indianapolis, Ind.	.60	.60	....	.90	.75@1.00	.75@1.00
Joliet, Plainfield and Hammond, Ill.	.60	.50	.50	.60	.60	.60
Mason City, Ia.	.50@ .60	.50@ .60	1.30	1.30	1.20	1.20
Mankato, Minn.	....	.45	1.25	1.25	1.25	1.25
Mattoon, Ill.	.75@ .85	.60@ .85	.85	.85	.85	.85
Milwaukee, Wis.	.96	.91	1.06	1.06	1.06	1.06
Moline, Ill.	.60@ .85	.60@ .85	1.00@1.20	1.00@1.20	1.00@1.20	1.00@1.20
Northern New Jersey	.40@ .60	.40@ .60	1.25	1.25	1.25	1.25
Pittsburgh, Penn.	1.25	1.25	.85	.85	.85	.85
Silverwood, Ind.	.75	.75	.75	.75	.75	.75
St. Louis, Mo.	.83	1.45	1.55a	1.45	1.45	1.45
Terre Haute, Ind.	.75	.75	.75	.75	.75	....
Wolcottville, Ind.	.75	.75	.75	.75	.75	.75
Waukesha, Wis.	....	.45	.60	.60	.65	.65
Winona, Minn.	.40	.40	1.50	1.25	1.15	1.15
Zanesville, Ohio	....	.60	.50	.60	.80	....
SOUTHERN:						
Charleston, W. Va. (b)		All sand, 1.40. All gravel, 1.40				
Brewster, Fla.	.50@ .60	.50@ .60	2.25	....	....	....
Chattahoochie River, Fla.	....	.70	....	1.75	....	....
Eustis, Fla.	....	.50@ .60	....	....	....	....
Ft. Worth, Texas	2.00	2.00	2.00	2.00	2.00	2.00
Knoxville, Tenn.	1.00	1.20	1.30	1.20	1.20	1.20
Lindsay, Texas	....	....	....	....	.55	....
Macon, Ga.	.50	....	....	....	....	....
New Martinsville, W. Va.	1.00	.90@1.00	....	1.20@1.30	....	.80@ .90
Roseland, La.	35	.35	1.25	1.00	.80	.80
WESTERN:						
Kansas City, Mo.	....	.70	....	....	....	....
Los Angeles, Calif. (d)	.50	.50	1.10	1.10	....	1.10c
Oregon City, Ore.	....	1.50*	1.50*	1.50*	1.50*	1.50*
Phoenix, Ariz.	1.25*	1.25*	2.50*	2.00*	1.50*	1.25*
Pueblo, Colo.	.80	.60	....	1.20	....	1.15
San Diego, Calif.	.65@ .75	.65@ .75	1.50	1.30	1.10	1.10
Seattle, Wash. (bunkers)	1.25	1.25	1.25	1.25	1.25	1.25

Bank Run Sand and Gravel

City or shipping point	Fine Sand, 1/10 in. down	Sand, ¼ in. and less	Gravel, ½ in. and less	Gravel, 1 in. and less	Gravel, 1½ in. and less	Gravel, 2 in. and less
Algonquin and Beloit, Wis.			Dust to 3 in., .40			
Chicago district, Ill.	.35	....	....	....	....	....
Ferrysburg, Mich.	....	....	....	....	....	.65@1.00
East Hartford, Ohio	.75*	....	....	....	....	....
Gainesville, Texas	....	1.00	....	....	.55	....
Grand Rapids, Mich.	....	....	....	.50	....	....
Hamilton, Ohio	....	....	....	.67	....	....
Hersey, Mich.	....	....	....	.50	....	....
Indianapolis, Ind.		Mixed gravel for concrete work, at .65				
Joliet, Plainfield and Hammond, Ill.	.35	1.25	....	....	....	....
Macon, Ga.	.35@ .50	....	....	....	.90	....
Mankato, Minn.	.30	....	....	....	....	....
Moline, Ill. (b)	.60	.60	Concrete gravel, 50% G., 50% S., 1.00			
Ottawa, Oregon, Moronts and Yorkville, Ill.		Ave. .60 per ton all sizes				
Roseland, La.	....	....	.35	....	....	....
Somerset, Penn.	....	1.85@2.00	....	1.50@1.75	....	....
St. Louis, Mo.		Mine run gravel, 1.55 per ton				
Summit Grove, Ind.	.50	.50	.50	.50	.50	.54
Winona, Minn.	.40	.40	.60	.60	.60	.60
York, Penn.	1.10	1.06	....	....	....	....

(a) ⅝ in. down. (b) River run. (c) 2½ in. and less.
*Cubic yd. †Include freight and bunkerage charges and truck haul. ‡Delivered on job by truck.
(d) Less 10c per ton if paid E.O.M. 10 days. (e) pit run. (f) plus 15c winter loading charge.
(g) ¾-in. and less.

Core and Foundry Sands

Silica sand is quoted washed, dried and screened unless otherwise stated. Prices per ton f.o.b. producing plant.

City or shipping point	Molding, fine	Molding, coarse	Molding, brass	Core	Furnace lining	Sand blast	Stone sawing
Aetna, Ill.				.30@ .35			
Albany, N. Y.	2.00@2.25	2.00	2.00	1.50@2.25	1.50@2.00	1.75@4.50	
Arenzville, Ill.	1.50@1.75			1.00			
Beach City, Ohio	1.75@2.00	1.75@2.00		1.75	2.00		1.75
Buffalo, N. Y.	1.50	1.50		2.00@2.50			
Columbus, Ohio	1.25@2.00	1.25@1.75	2.00@2.50	.30@1.50	2.00@2.50	2.75@3.50	1.50@3.00
Dresden, Ohio	1.50@1.75	1.50	1.75	1.25			
Eau Claire & Chippewa Falls, Wis.						3.00	
Elco, Ill.	Ground silica per ton in carloads—18.00@31.00						
Estill Springs and Sewanee, Tenn.	1.25			1.25		1.35@1.50	
Franklin, Pa.	1.75	1.75		1.75			
Klondike, Mo.	1.75@2.00		1.75@2.00	1.75@2.00	1.75@2.00		1.75
Maplet'n Depot, Pa.	2.00@2.25	2.00		1.90@2.00		2.00	
Massillon, Ohio	2.50	2.50		2.50	2.50		
Mendota, Va.	Ground flint or silex—16.00@20.00 per ton						
Michigan City, Ind.				.30	.30		
Millville, N. J.				1.75b		3.50	
New Lexington, O.	2.75	2.25					
Ohlton, Ohio	2.00*	2.00*		2.00*	2.00*	2.50*	2.00*
Ridgway, Pa.	1.50	1.50	1.50@1.75		1.50d		
Round Top, Md.	1.25			1.60		2.25	
San Francisco and Oakland, Calif.	3.50	5.00	3.50	3.50@5.00e	3.50@5.00	3.50@5.00	
Silica, Va.	Potters' flint per ton, 9.00@10.00						
Thayers, Penn.	1.25	1.25		2.00			
Utica & Ottawa, Ill.	.50@1.15§	.50@1.15§	.90@1.15f	.50@.90§	.50@ .90§	3.00@3.50f	.90@3.50f
Utica, Penn.	1.75	1.75		2.00			
Warwick, Ohio	*1.75@2.25	*1.75@2.25	*1.75	*1.75@2.25	*1.75@2.25		
Zanesville, Ohio	2.00‡	1.50‡	2.00‡	2.00	2.00		

*Green. †Crude silica, crushed and screened, not washed or dried. ‡Plus 75c per ton for winter loading. ¶Crude. §Crude and dry. (a) Delivered. (b) Damp. (c) Shipped from Albany. (d) Delivered Buffalo or Black Rock. (e) Washed and drained only, 1.50. (f) Dried, screened.

Crushed Slag

City or shipping point	Roofing	¼ in. down	½ in. and less	¾ in. and less	1½ in and less	2½ in. and less	3 in. and larger
EASTERN:							
Buffalo, N. Y., Emporium, Erie and Dubois, Pa.	2.25	1.25	1.25	1.25	1.25	1.25	1.25
Eastern Penn.	2.50	1.20	1.50	1.20	1.20	1.20	1.20
Northern N. J.	2.50	1.20	1.50	1.20	1.20	1.20	1.20
Reading, Penn.	2.50	1.00		1.25			
Western Penn.	2.50	1.25	1.50	1.25	1.25	1.25	1.25
CENTRAL:							
Ironton, Ohio		1.30*	1.80*	1.45*		1.45*	
Jackson, Ohio		1.05*		1.30*	1.05*	1.30*	1.30*
Toledo, Ohio	1.50	1.25	1.25	1.25	1.25	1.25	1.25
Youngst'n, O., dist.	2.00	1.25	1.35	1.35	1.25	1.25	1.25
SOUTHERN:							
Ashland, Ky.		1.55*		1.55*	1.55*	1.55*	1.55*
Ensley and Alabama City, Ala.	2.05	.80	1.35	1.25	.90	.90	.80
Longdale, Roanoke, Ruessens, Va.	2.50	1.00	1.25	1.25	1.25	1.15	1.15
Woodward, Ala.	2.05*	.80*	1.35*	1.25*	.90*	.90*	

*5c per ton discount on terms.

Lime Products (Carload Prices Per Ton F.O.B. Shipping Point)

	Finishing hydrate	Masons' hydrate	Agricultural hydrate	Chemical hydrate	Ground burnt lime, Blk.	Ground burnt lime, Bags	Lump lime, Blk.	Lump lime, Bbl.
EASTERN:								
Berkeley, R. I.			12.00					2.15e
Buffalo, N. Y.		12.00	12.00	12.00			10.00	1.95d
Chazy, N. Y.		8.50	7.50	10.00		15.50$_9$	8.50	14.00
Lime Ridge, Penn.							5.00a	
West Stockbridge, Mass.	12.00	10.00	5.60					2.00t
Williamsport, Penn.			10.00				6.00	
York, Penn.		9.50	9.50	10.50	8.50	10.50	8.50	1.65i
CENTRAL:								
Afton, Mich.							8.50	1.35
Carey, Ohio	12.50	8.50	8.00		9.00		8.00	2.00
Cold Springs, Ohio		8.50	8.50				8.00	
Cold Springs and Gibsonburg, Ohio	12.50	8.50	8.50		9.00	11.00		
Frederick, Md.		10.00	10.00	10.00	8.50	10.00	7.00	
Huntington, Ind.	12.50	8.50	8.50		9.00		8.00	
Luckey, Ohio	12.50							
Marblehead, Ohio		8.50	8.50		9.00		8.00	1.50w
Milltown, Ind.		8.50@10.00		10.00p			8.50$_3$	1.35r
Sheboygan, Wis.	11.50						9.50	.95
Wisconsin points (f)		11.50					9.50	
Woodville, Ohio	12.50	8.50	8.50	13.50	9.00	11.00$_1$	9.00	1.50c
SOUTHERN:								
Allgood, Ala.	12.50	10.00			8.50		8.50	1.50
El Paso, Texas							7.00	
Graystone & Landmark, Ala.	12.50		9.00	9.00			8.50	1.35
Keystone, Ala.	10.00	8.00	8.00	8.00			7.00	1.25
Knoxville, Tenn.	20.25	9.00	9.00	8.00	1.25e	8.00	1.35	
New Braunfels, Tex.	18.00	12.00	10.00	12.00	10.00		9.50	
Ocala, Fla.	12.00	11.00	10.00				12.00	1.50
Saginaw, Ala.	12.50	10.00	9.00	10.00			8.50	1.50
WESTERN:								
Kirtland, N. M.							15.00	
Limestone, Wash.	15.00	15.00	10.00	15.00	16.50	16.50	16.50	2.09
Los Angeles, Calif.	19.00	19.00	14.00		16.20		12.50	2.50
Dittlinger, Tex.		12.00@13.00					9.50p	1.50$_4$
San Francisco, Calif.	21.00	19.00	16.50				14.00	2.00
Tehachapi, Calif.			8.00				13.00z	2.20x
Seattle, Wash.	19.00	19.00	12.00	19.00	19.00		18.60	2.30

†50-lb. paper bags; (a) net ton; (c) wooden, steel 1.70; (d) steel; (e) per 180-lb. barrel; (f) dealers' prices, net 30 days less 25c disc. per ton on hydrated lime and 5c per bbl. on lump if paid in 10 days; (i) 180-lb. net barrel, 1.65; 280-lb. net barrel, 2.65; (p) to 11.00; (q) to 8.75; (r) to 1.50; (s) in 80-lb. burlap sacks; (t) to 3.00; (u) two 90-lb. bags; (v) oil burnt; wood burnt 2.25@2.50; (x) wood, steel 2.30; (z) to 15.00; (*) quoted f.o.b. New York; (‡) paper bags; (w) to 1.50 in two 90-lb. bags, wood bbl. 1.60; (¶) to 10.00; ($_1$) 80-lb. paper bags; ($_2$) to 3.00; ($_3$) to 9.00; ($_4$) to 1.60. ($_5$) to 16.00; ($_6$) wood bbl., steel, 1.80; ($_7$) quoted f.o.b. Marble Cliff, Ohio; ($_8$) superfine; ($_9$) barrels.

Miscellaneous Sands

(Continued)

City or shipping point	Roofing sand	Traction
Mapleton Depot, Penn.		2.00@ 2.25
Massillon, Ohio		2.25
Michigan City, Ind. (Engine sand)		.20@ .30
Mineral Ridge, Ohio	*1.75	*1.75
Montoursville, Penn.		1.00@ 1.10
Ohlton, Ohio	a2.00	a1.75
Red Wing, Minn.		1.25
Round Top, Md.	2.25	1.75
San Francisco, Calif.	3.50	3.50
Thayers, Penn.		2.25
Utica & Ottawa, Ill.	b.90@ 3.50	.90
Warwick, Ohio		2.25
Zanesville, Ohio		2.50

*Wet. †Fine; coarse dry, 3.00@3.50. (a) Green. (b) Dried, screened.

Talc

Prices given are per ton f.o.b. (in carload lots only), producing plant, or nearest shipping point.

Baltimore, Md.:	
Crude talc (mine run)	3.00@ 4.00
Ground talc (20-50 mesh), bags	10.00
Cubes	55.00
Blanks (per lb.)	.08
Pencils and steel worker's crayons	.08
per gross	1.00@ 1.50
Chatsworth, Ga.:	
Crude talc, grinding	5.00
Ground talc (150-200 mesh) bags	10.00
Pencils and steel worker's crayons, per gross	1.00@ 2.50
Chester, Vt.:	
Crude talc	3.50@ 4.00
Ground talc (150-200 mesh), bulk	8.00@ 9.00
Including bags	9.00@10.00
Chicago and Joliet, Ill.:	
Ground (150-200 mesh), bags	30.00
Dalton, Ga.:	
Crude talc	5.00
Ground talc (150-200) bags	10.00@12.00
Pencils and steel workers' crayons, per gross	1.00@ 1.50
Emeryville, N. Y.:	
(Double air floated) including bags; 325 mesh	14.75
200 mesh	13.75
Hailesboro, N. Y.:	
Ground white talc (double and triple air floated) including bags, 300-350 mesh	15.50@20.00
Henry, Va.:	
Crude (mine run)	3.50@ 4.00
Ground talc (150-200 mesh), bulk	8.50@16.00
Joliet, Ill.:	
Roofing talc, bags	12.00
Ground talc (200 mesh), bags	32.00
Keeler, Calif.:	
Ground (200-300 mesh), bags	20.00@30.00
Natural Bridge, N. Y.:	
Ground talc (125-200 mesh), bags	10.00@15.00

Rock Phosphate

Prices given are per ton (2240-lb.) f.o.b. producing plant or nearest shipping point.

Lump Rock

Gordonsburg, Tenn.—B.P.L. 65-72%	3.75@ 4.50
Mt. Pleasant, Tenn.—B.P.L. 75%	5.50@ 6.00
Tennessee—F.O.B. mines, gross ton, unground brown rock, B.P.L. 72%	5.00
B.P.L. 75%	6.00
Twomey, Tenn.—B.P.L. 65%, 2000 lb.	8.00@ 9.00

Ground Rock

(2000 lbs.)

Centerville, Tenn.—B.P.L. 65%	8.00
Gordonsburg, Tenn.—B.P.L. 65-70%	4.00@ 4.50
Mt. Pleasant, Tenn.—B.P.L. 72%	5.00@ 5.50
Twomey, Tenn.—B.P.L. 65%	8.00@ 9.00

Florida Phosphate

(Raw Land Pebble)

(Per Ton.)

Florida—F. O. B. mines, gross ton, 68/66% B.P.L., Basis 68%	3.25
70% min. B.P.L., Basis 70%	3.75

Mica

Prices given are net, F.O.B. plant or nearest shipping point.

Pringle, S. D.—Mine run, per ton	125.00
Punch mica, per lb.	.06
Scrap, per ton, carloads	20.00
Rumney Depot, N. H.—per ton,	
Mine run	360.00
Clean shop scrap	25.00
Mine scrap	22.00
20 mesh	30.00
60 mesh	45.00
100 mesh	50.00
Roofing mica	35.00
Punch mica, per lb.	.12

Special Aggregates

Prices are per ton f.o.b. quarry or nearest shipping point.

City or shipping point	Terrazzo	Stucco-chips
Barton, Wis., f.o.b. cars	....	10.50
Brandon, Vt.—English pink, English cream and coral pink	*11.00	*11.00
Brandon grey	*11.00	*11.00
Brighton, Tenn.—Pink	6.00	5.00
Mixed pink and bronze	4.50@ 6.00	4.50@ 6.00
All colors, mixed sizes	3.50	3.50
Buckingham, Que.—Buff stucco dash	....	12.00@14.00
Chicago, Ill. — Stucco chips, in sacks f.o.b. quarries	....	17.50
Crown Point, N. Y.—Mica spar	....	9.00@10.00
Dayton, Ohio	....	6.00@24.00
Easton, Penn., and Phillipsburg, N. J.	....	12.00@16.00
Haddam, Conn. — Felstone buff	15.00	15.00
Harrisonburg, Va.—Bulk marble (crushed, in bags)	†12.50	†12.50
Ingomar, Ohio — Concrete facings and stucco dash	....	4.25
Middlebrook, Mo.—Red	....	20.00@25.00
Middlebury, Vt.—Middlebury white	‡9.00	‡9.00
Middlebury and Brandon, Vt.—Caststone, per ton, including bags	....	5.50
Milwaukee, Wis.	....	14.00@34.00
Newark, N. J.—Roofing granules	....	7.50
New York, N. Y.—Red and yellow Verona	....	32.00
Red Granite, Wis.	....	7.50
Stockton, Calif. — "Natrock" roofing grits	....	12.00@15.00
Tuckahoe, N. Y.—Tuckahoe white	12.00	....
Wauwatosa, Wis.	....	20.00@32.00
Wellsville, Colo.—Colorado Travertine Stone	15.00	15.00

†C.L. L.C.L. 17.00.
*C.L. including bags; L.C.L. 14.50
‡C.L. including bags, L.C.L. 10.00.

Potash Feldspar

Auburn and Brunswick, Me.—Color, white; 98% thru 140 mesh bulk	19.00
Buckingham, Que.—Color, white; analysis, K_2O, 12-13%; Na_2O, 1.75%; bulk	9.00
De Kalb Jct., N. Y.—Color, white; bulk (crude)	9.00
East Hartford, Conn.—Color, white, 95% through 60 mesh, bags	16.00
96% thru 150 mesh, bags	28.00
East Liverpool, Ohio—Color, white; 98% thru 200 mesh, bulk	19.35
Soda feldspar, crude, bulk, per ton	22.00
Erwin, Tenn.—Color, white; analysis, 12.07% K_2O, 19.34% Al_2O_3; Na_2O, 2.92%; SiO_2, 64.76%; Fe_2O_3, .36%; 98.50% thru 200 mesh, bags, 16.90; bulk	15.50
Glen Tay Station, Ont., color, red or pink; analysis: K_2O, 12.81%, crude (bulk)	7.00
Keystone, S. D.—Prime white, bulk (crude)	8.00
Los Angeles, Calif. — Color, white; analysis, K_2O, 12.16; Na_2O, 1.53; SiO_2, 65.60; Fe_2O_3, .10; Al_2O_3, 19.20; crude	11.00
Pulverized, 95% thru 200 mesh; bags, 22.00; bulk	20.00
For glass manufacturers — (F. o. b. C.L., sacks included): Grade A: Analysis, Al_2O_3, 19.20; Fe_2O_3, .10—	20.48
Grade B: Analysis, Al_2O_3, 18.94; Fe_2O_3, .10	18.33
Murphysboro, Ill.—Color, prime white; analysis, K_2O, 12.60%; Na_2O, 2.35%; SiO_2, 63%; Fe_2O_3, .06%; Al_2O_3, 18.20%; 98% thru 200 mesh; bags, 21.00; bulk	20.00
Penland, N. C.—Color, white; crude, bulk	8.00
Ground, bulk	16.50
Spruce Point, N. C., and Bristol, Tenn. —Color, white; 90% thru 200 mesh, bulk	12.50@20.00
Tenn. Mills—Color, white; analysis K_2O, 18%; Na_2O_3, 10%; 68% SiO_2; 99% thru 200 mesh; bulk	18.00
99% thru 140 mesh, bulk	16.00
Topsham, Me.—98% thru 140 mesh, bulk	19.00
Toronto, Can.—Color, flesh; analysis K_2O, 12.75%; Na_2O, 1.96%; crude	7.50@ 8.00

Chicken Grits

Afton Mich. (limestone) per ton	10.00
Belfast and Rockland, Me.—(Limestone), bags, per ton	‡10.00
Brandon and Middlebury, Vt., per ton	10.00
Cartersville, Ga.—(Limestone), per bag	2.00
Centerville, Iowa (gypsum) per ton	18.00
Chico, Texas (limestone), 100 lb. bags, per ton	8.00@ 9.00
Danbury, Conn. (limestone), bulk	6.00@ 7.00
Easton, Penn.—Per ton, bulk	3.00
Joliet, Ill.—(Limestone), bags, per ton	4.50
Knoxville, Tenn.—per bag	1.25
Los Angeles, Calif. (feldspar) per ton	15.00
Gypsum, Ohio.—(Gypsum) per ton	10.00
Limestone, Wash. (limestone) per ton	12.50
Rocky Point, Va. (limestone) 100 lb. bags, 50c; sacks, per ton, 6.00 bulk	5.00
Seattle, Wash.—(Limestone), bulk, per ton	12.00
Warren, N. H.—(Mica) per ton	3.85@ 3.90
Waukesha, Wis.—(Limestone), per ton	8.00
West Stockbridge, Mass.—(Limestone) bulk	‡7.50@*9.00
Wisconsin Points (limestone) per ton	9.00

*L.C.L. †Less than 5-ton lots. ‡C.L.

Sand-Lime Brick

Prices given per 1000 brick f.o.b. plant or nearest shipping point, unless otherwise noted.

Albany, Ga.	10.00@11.00
Anaheim, Calif.	10.50@11.00
Barton, Wis.	10.50@13.00b
Boston, Mass.	*17.00
Brighton, N. Y.	*19.75
Brownstone, Penn.	11.50@12.00
Dayton, Ohio	12.00@13.50
Detroit, Mich.	13.50@15.00
Farmington, Conn.	13.00
Flint, Mich.	¶12.00@17.50*
Grand Rapids, Mich.	12.00
Hartford, Conn.	*19.00
Jackson, Mich.	12.25
Lakeland, Fla.	10.00@11.00
Lake Helen, Fla.	8.00@15.00
Lancaster, N. Y.	12.50
Madison, Wis.	a12.50
Michigan City, Ind.	11.00
Milwaukee, Wis.	*13.00
Minneapolis and St. Paul, Minn.	10.00
Minnesota Transfer	10.00
New Brighton, Minn.	10.00
Pontiac, Mich.	12.00@13.50
Portage, Wis.	16.00
Prairie du Chien, Wis.	18.00@22.50
Rochester, N. Y.	*19.75
Saginaw, Mich.	13.00
San Antonio, Texas	16.00
Sebewaing, Mich.	12.00
Sioux Falls, S. Dak.	13.00c
Syracuse, N. Y.	18.00@20.00*
Toronto, Canada	13.50
Wilkinson, Fla.	10.00@12.00
Winnipeg, Canada	*15.00

*Delivered on job. †Delivered in city. ‡Less 5%. ¶Dealers' price. (a) Less .50 E.O.M. 10 days. (b) Delivered to Milwaukee. (c) Delivered at yard.

Portland Cement

Prices per bag and per bbl, without bags net in carload lots.

	Per Bag	Per Bbl
Albuquerque, N. M.	.86¾	3.47
Atlanta, Ga.	——	2.35
Baltimore, Md.	....	2.25
Birmingham, Ala.	....	2.30
Boston, Mass.	....	2.13
Buffalo, N. Y.	....	2.20
Butte, Mont.	.90¼	3.61
Cedar Rapids, Iowa	....	2.24
Charleston, S. C.	....	2.35
Cheyenne, Wyo.	.82¾	3.31
Cincinnati, Ohio	....	2.32
Cleveland, Ohio	....	2.24
Chicago, Ill.	....	2.05
Columbus, Ohio	....	2.29
Concrete, Wash.	....	2.35
Dallas, Texas	....	2.00
Davenport, Iowa	....	2.24
Dayton, Ohio	....	2.33
Denver, Colo.	.66¼	2.65
Detroit, Mich.	....	1.95@2.05
Duluth, Minn.	....	2.04
Houston, Texas	....	2.00
Indianapolis, Ind.	....	2.19
Jackson, Miss.	....	2.50
Jacksonville, Fla.	....	2.20
Jersey City, N. J.	....	2.13
Kansas City, Mo.	....	1.92
Los Angeles, Calif.	.62½	2.70
Louisville, Ky.	.54⅛	——
Memphis, Tenn.	....	2.50
Milwaukee, Wis.	....	2.10
Minneapolis, Minn.	....	2.12
Montreal, Que.	....	1.36
New Orleans, La.	....	2.20
New York, N. Y.	....	1.93
Norfolk, Va.	....	2.17
Oklahoma City, Okla.	....	2.46
Omaha, Neb.	....	2.36
Peoria, Ill.	....	2.22
Philadelphia, Penn.	....	2.11
Phoenix, Ariz.	.81½	3.26
Pittsburgh, Penn.	....	2.04
Portland, Colo.	....	2.80
Portland, Ore.	.67½	2.50@2.70
Reno, Nev.	.75¼	3.01
Richmond, Va.	....	2.40
Salt Lake, Utah	.70¼	2.81
San Francisco, Calif.	.57¾	2.31
Savannah, Ga.	....	2.50
St. Louis, Mo.	....	2.05
St. Paul, Minn.	....	2.12
Seattle, Wash.	....	2.65
Tampa, Fla.	——	2.25
Toledo, Ohio	....	2.20
Topeka, Kans.	....	2.41
Tulsa, Okla.	....	2.33
Wheeling, W. Va.	....	2.12
Winston-Salem, N. C.	....	2.78

NOTE—Add 40c per bbl. for bags.
†Delivered on job in any quantity, sacks extra.
‡Less 5c bbl. 10 days.
*Ten cents discount for cash, 10 days. (a) Price includes sacks.

Mill prices f.o.b. in carload lots, without bags, to contractors.

	Per Bag	Per Bbl
Buffington, Ind.	....	1.80
Chattanooga, Tenn.	....	2.45*
Concrete, Wash.	....	2.35
Davenport, Calif.	....	2.05
Detroit, Mich.	....	2.15
Hannibal, Mo.	....	1.90
Hudson, N. Y.	....	1.75
Leeds, Ala.	....	1.85
Mildred, Kans.	....	2.35
Nazareth, Penn.	....	1.95
Northampton, Penn.	....	1.75
Richard City, Tenn.	....	2.05
Steelton, Minn.	....	1.85
Toledo, Ohio	....	2.20
Universal, Penn.	....	1.80

*Including sacks at 10c each.

Gypsum Products—CARLOAD PRICES PER TON AND PER M SQUARE FEET, F. O. B. MILL

	Crushed Rock	Ground Gypsum	Agricultural Gypsum	Stucco Calcined Gypsum	Cement and Gauging Plaster	Wood Fiber	White Gauging	Sanded Plaster	Keene's Cement	Trowel Finish	—Plaster Board— ⅜x32x36". Wt. 1500 lb. Per M Sq. Ft.	—Plaster Board— ½x32x36". Wt. 1850 lb. Per M Sq. Ft.	Wallboard, ⅜x32 or 48". Lgths. 6'-10', 1850 lb. Per M Sq. Ft.
Arden, Nev. and Los Angeles, Calif.	3.00	8.00u	8.00u	10.70u	10.70u		....	....	....	11.70u	....	——	
Centerville, Iowa	3.00	10.00	15.00	10.00	10.00	10.50	13.50			13.50			
Des Moines, Ia.	3.00	8.00	9.00	10.00	10.00	10.50	13.50	12.00	24.00	22.00	18.00	21.00	30.00
Detroit, Mich.	....	....	....	....	14.30o	12.30m	....	m9.00@11.00o	....				
Delawanna, N. J.	——	——	——	——	——	8.00	....	8.25@9.40		....	.14⅖s	.15⅕s	40.00@41.00
Douglas, Ariz.			6.00				15.00	....	40.00	13.50	35.00	45.00	....
Grand Rapids, Mich.	2.75	6.00	6.00	8.00	9.00	9.00	17.50	....	24.55	20.00	——	....	....
Gypsum, Ohio	3.00	4.00	6.00	8.00	9.00	9.00	20.00	7.00	27.00	19.00	....	15.00	30.00
Los Angeles, Calif.	....	....	7.50@9.50	11.50y	....	....	....	....	....	....	....	....	....
Port Clinton, Ohio	3.00	4.00	6.00	10.00	9.00	9.00	21.00	7.00	30.15	20.00	——	20.00	30.00
Portland, Colo.	——	——	....	10.00	....	....	....	....	....	....	....	....	....
San Francisco, Calif.	....	....	11.65m	13.40r	14.40r	——	15.40r	——	——	——	——	——	——
Seattle, Wash.	6.40	11.00	11.00	13.00	....	....	....	....	....	....	....	....	....
Sigurd, Utah	....	....	....	....	....	....	....	....	21.50	....	....	....	....
Winnipeg, Man.	5.00	5.00	7.00	13.00	14.00	14.00	....	....	....	....	20.00	25.00	33.00

NOTE—Returnable bags, 10c each; paper bags, 1.00 per ton extra (not returnable).
*To 3.00; †to 11.00; ‖to 12.00; ‡prices per net ton, sacks extra; (a) to 25.00; (b) net; (c) gross; (d) hair fibre; (g) delivered; (h) delivered in six states; (i) delivered on job; (k) sacks 12c extra, rebated; (m) includes paper bags; (o) includes jute sacks; (r) including sacks at 15c; (s) per board; (t) to 16.50; (u) includes sacks; (v) F.O.B. N. Y. C. and dealer's yard in mill locality; (x) Hardwall plaster; (y) sacks 15c extra, rebated.

Market Prices of Cement Products

Concrete Block

Prices given are net per unit, f.o.b. plant or nearest shipping point

City of shipping point	Sizes 8x8x16	8x10x16	8x12x16
Camden, N. J.	17.00	......	......
Cement City, Mich.		5x8x12—55.00¶	
Columbus, Ohio	.16@.18a	......	......
Detroit, Mich.	.16	......	.18
Forest Park, Ill.	18.00*	23.00*	30.00*
Grand Rapids, Mich.	15.00	......	......
Graettinger, Iowa	.18@.20	......	......
Indianapolis, Ind.	.13@.15†	......	......
Los Angeles, Calif.¶	5¾x3½x12—55.00	7¾x3½x12—65.00	
Oak Park, Ill.	18.00	......	......
Olivia and Mankato, Minn.	9.50b	......	......
Somerset, Penn.	.20@.25	......	......
Tiskilwa, Ill.	.16@.18†	......	......
Yakima, Wash.	20.00*	......	......

*Price per 100 at plant. †Rock or panel face. (a) Face. ‡Delivered. ¶Price per 1000. (b) Per ton.

Cement Roofing Tile

Prices are net per sq. in carload lots, f.o.b. nearest shipping point unless otherwise stated.

Camden and Trenton, N. J.—8x12, per sq.

Red	15.00
Green	18.00
Chicago, Ill.—per sq.	20.00

Cicero, Ill.—Hawthorne roofing tile, per sq.

	Chocolate, Red, Yellow, Gray and Orange	Green, Blue
French and Spanish†	$11.50	$13.50
Ridges (each)	.25	.35
Hips	.25	.35
Hip starters	.50	.60
Hip terminals, 2-way	1.25	1.50
Hip terminals, 4-way	4.00	5.00
Mansard terminals	2.50	3.00
Gable finials	1.25	1.50
Gable starters	.25	.35
Gable finishers	.25	.35
*End bands	.25	.35
*Eave closers	.06	.08
*Ridge closers	.05	.06

*Used only with Spanish tile.
†Price per square.

Houston, Texas.—Roofing Tile, per sq.	25.00
Indianapolis, Ind.—9x15-in.	Per sq.
Gray	10.00
Red	11.00
Green	13.00
Waco, Texas:	Per sq.
4x4	.60

Cement Building Tile

Cement City, Mich	Per 1000
5x8x12	55.00
Detroit, Mich.	Per 100
5x4x12	4.50
5x8x12	8.00
Longview, Wash.	Per 1000
4x6x12	52.00
4x8x12	64.00
Mt. Pleasant, N. Y.:	Per 1000
5x8x12	78.00
Grand Rapids, Mich.:	Per 100
5x8x12	7.00
Houston, Texas:	
5x8x12 (Lightweight)	80.00
Pasadena, Calif. (Stone-Tile)	Per 100
3½x4x12	3.00
3½x6x12	4.00
3½x8x12	5.50
Tiskilwa, Ill.—8x8, per 100	15.00
Wildasin Spur, Los Angeles, Calif. (Stone-Tile)	Per 1000
3½x6x12	50.00
3½x8x12	60.00
Prairie du Chien, Wis.:	
5x8x12	82.00
5x4x12	46.00
5x8x 6 (half-tile)	41.00
5x8x10 (fractional)	82.00
Yakima, Wash.—Building tile:	
5x8x12	.10

Cement Drain Tile

Graettinger, Iowa—5 to 36 in., per ton	8.00
Olivia and Mankato, Minn.—Cement drain tile, per ton	8.00
Tacoma, Wash.—Drain tile per ft.:	
3 in.	.04
4 in.	.05
6 in.	.07½
8 in.	.10
Waukesha, Wis.—Drain tile, per ton	8.00

Concrete Brick

Prices given per 1000 brick, f.o.b. plant or nearest shipping point.

	Common	Face
Appleton, Minn.	22.00	25.00@40.00
Baltimore, Md. (Del. according to quantity)	15.50	22.00@50.00
Camden and Trenton, N. J.	17.00	
Ensley, Ala. ("Slag-tex")	14.50	22.50@33.50
Eugene, Ore.	25.00	35.00@75.00
Friesland, Wis.	22.00	32.00
Longview, Wash.	18.00	25.00@75.00
Milwaukee, Wis.	15.00	28.00@50.00
Mt. Pleasant, N. Y.	......	14.00@23.00
Oak Park, Ill.	25.00	a42.00
Omaha, Neb.	18.00	30.00@40.00
Pasadena, Calif.	10.00	......
Philadelphia, Penn.	14.75	20.00
Portland, Ore.	17.50	25.00@75.00
Mantel brick—100.00@150.00		
Prairie du Chien, Wis.	14.00	22.50@25.00
Rapid City, S. D.	18.00	25.00@80.00
Waco, Texas	16.50	32.50@125.00
Watertown, N. Y.	20.00	35.00
Westmoreland Wharves, Penn.	14.75	20.00
Winnipeg, Man.	14.00	22.00
Yakima, Wash.	22.50	......

†Gray. ‡Red. (a) Haydenite H. Brick.

West Penn Portland Cement Mill Ready

THE new cement plant at West Winnfield, Penn., of the West Penn Portland Cement Co., will begin making shipments about April 1. All the necessary machinery has been installed and was set in motion recently to see that the installation has been properly made.

At present there are about 150 men employed at the plant. The company has an office in the Forquer building at 223 South Main street.

O. J. Binford is general manager. He was formerly secretary of the Southwestern Portland Cement Co. at El Paso, Tex., and Osborn, Ohio.

North Carolina Cement Project Rumored

NEW BERN, N. C., has been selected as the site for a large cement manufacturing plant, which is to be financed by mid-western capital. Tentative plans, it is understood, are for the erection of a plant to cost about $3,000,000, with a capacity of 1,250,000 bbl. of cement annually.

J. A. Acker of Port Huron, Mich., in company with other business men, has been in North Carolina for several days investigating possibilities for locating the cement plant in eastern North Carolina. New Bern, it is said, was selected for its adjacent deposits of limestone and its transportation facilities.

The cement representatives had conferences with Governor McLean of North Carolina and also with the office of Herman Bryson, state geologist. Mr. Bryson was away at the time, being in attendance at the southern mining conference.

It is said that the prospectors found marl and other elements that they need around New Bern, together with water and sailing advantages.

The announcement of the project has caused widespread comment around North Carolina. The cement consumption in the "Tar Heel" state last year was 3,700,000 bbl. The new company, according to announcements, will manufacture about one-third of the state's requirements.

Current Prices Cement Pipe

Prices are net per foot f.o.b. cities or nearest shipping point in carload lots unless otherwise noted.

Culvert and Sewer	4 in.	6 in.	8 in.	10 in.	12 in.	15 in.	18 in.	20 in.	22 in.	24 in.	27 in.	30 in.	36 in.	42 in.	48 in.	54 in.	60 in.
Detroit, Mich.								15.00 per ton									
Graettinger, Iowa	.04½d	.05½	.08½	.12½	.17½	—	.40	.50	.60	.70	—	—	—	—	—	—	—
G'd Rapids, Mich. (b)																	
Culvert pipe	......	......	......	.60	.72	1.00	1.28	1.60†	......	1.92	2.32	3.00	4.00	......	7.00	......	—
Sewer pipe (d)	......	......	......	......	......	.63	......	.60†	......	......	......	.58	......	......	......	......	—
Houston, Texas	......	.19	.28	.43	.55½	.90	1.30	......	†1.70	2.20	—	......	......	......	......	—	—
Indianapolis, Ind. (a)	......	......	......	.80	.90	1.10	1.30	......	......	1.70	......	2.70	—	—	—	—	—
Longview, Wash.							Sewer pipe 40% off list, culvert—list										
Mankato, Minn. (b)	......	......	......	—	—	—	—	......	......	1.50	1.75	2.50	3.25	4.25	......	—	—
Newark, N. J.							6 in. to 24 in., $18.00 per ton										
Norfolk, Neb. (b)	......	......	......	.90	1.00	1.13	1.42	......	......	2.11	—	2.75	3.58	......	6.14	......	7.78
Olivia, Mankato, Minn.							12.00 per ton										
Paullina, Iowa‡	......	......	......	......	......	......	......	2.25	......	2.11	—	2.75	3.58	......	6.14	—	7.78
Somerset, Penn.	......	......	......	......	1.08	1.25	1.65	......	—	2.50	—	3.65	4.85	7.50	8.50	......	—
Tacoma, Wash.	.15	.18	.22½	.30	.40	.55	.75	......	—	......	......	......	......	......	......	......	—
Tiskilwa, Ill. (rein.) (a)	......	......	—	.65	.75	.85	1.10	1.60	......	1.90	—	2.25	3.40	......	5.50	......	—
Wahoo, Neb. (b)	—	—	......	—	1.00	1.13	1.42	......	......	2.11	—	2.75	3.58	4.62	6.14	6.96	7.78
Yakima, Wash.										$10.00 per ton							

*30-in. lengths up to 27-in. diam., 48-in. lengths after; (a) 24-in. lengths; (b) Reinforced; (c) Interlocking bar reinforced. (d) Eastern clay list, 72% off.
†21-in. diam. ‡Price per 2 ft. length. (d) 5 in. diam. [1]@1.08 [2]@1.25. [3]@1.65. [4]@2.50. [5]@3.85. [6]@5.00. [7]@7.50.

Keystone Portland Cement Company Breaks Ground

THE Keystone Portland Cement Co., a $2,500,000 corporation at Easton, Penn., began March 14 the erection of a modern cement producing plant on a large tract of land which it has purchased near Bath, Penn. It is expected the mill will be in operation on December 31. The lines of the Lehigh & New England R. R. and the Northampton & Bath R. R. run through the property.

The company's property is just east of the Bath Portland Cement Co.'s plant and takes in several farms purchased at a total cost of $103,000. The land belonged formerly to the estate of the late Henry Steckel of Easton; Dr. F. G. Edelman, Bath; Lewis W. Siegfried, James D. Hugo and Thomas Deck. The larger portion came from the Steckel estate and the price paid the estate was about $48,000.

Th president of the company is John M. Buckland, Allentown, president of the National Slag Co.; vice-president, Fred B. Franks, director of the Ridge Avenue Deposit Bank, Allentown; treasurer, Judge Edward J. Fox, Easton, president of the Easton Trust Co. The directors are H. H. Farr of Farr Brothers, Allentown; Rufus W. G. Wint, manufacturer, Catasauqua, and Charles H. Groman, real estate operator, Bethlehem.—*Easton* (Penn.) *Express.*

Richard K Meade & Co., Baltimore, have been retained as designing and consulting engineers for the new plant, which is to have a capacity of 3000 bbl. per day; it will employ the wet process and will be the second new modern wet-process plant to be built in the Lehigh district. It will be equipped with all of the latest improvements for the manufacture of portland cement and will be prepared to manufacture high-testing, quick-hardening cement, such as has been put on the market by a few of the newer cement plants. The new plant is to be built just outside of the Borough of Bath, Penn., and between the Lehigh mill and the town.

Mr. Frank is well known in the cement industry, having originally built the plant of Wm. Kraus & Sons, at Martins Creek, some twenty-five years ago. This plant was later purchased by the Alpha Portland Cement Co. Mr. Franks then organized and built the plant of the Bath Portland Cement Co. at Bath, Penn., which plant was sold about two years ago to the Lehigh Portland Cement Co.

California Portland Cement Co. Buys New Quarry Property

SALE of a section of limestone land in the vicinity of Eden Hot Springs to the California Portland Cement Co., which operates at Slover mountain, Colton, Calif., has been recorded in Riverside county.

The land was formerly owned in part by heirs to the estate of the late D. E. Meyers, father of Mrs. H. A. Atwood of Riverside. With the recent death of the owner of the other portion of the land, and resultant closing of the estate, the sale was consummated. Consideration has not been made public.

Whether the company plans to open up the deposit of limestone in connection with its Colton plant has not been stated. According to mineral exports who have looked over the land, there are at least 10,000,000 tons of high grade limestone in sight for development.—*San Bernardino* (Calif.) *Telegram.*

Coplay Cement Mill Is Being Improved

EXTRAORDINARY improvements and changes have been made at Mill C, the modern mill of the Coplay Manufacturing Co. Of this mill, built on historic ground, hardly more than the name survived the year's remodeling work. Nineteen twenty-six will take its place in company history with 1872, when the first mill was built; 1894, when a second mill was built with Danish kilns, and 1908, when it was rebuilt with rotary kilns.

Installation of three modern three-compartment tube mills, displacing thirteen grinding machines, and change of motive power from 25 to 60 cycle, involving construction of a transformer sub-station building and replacing of 170 motors, are the biggest items of the improvement program, carried through at a very great cost.

The new mills, the first of their kind to be put into operation in the United States, have attracted the attention of the entire industry. They were built by G. Polysius, at Dessau, Germany. The three mills have an operating capacity 50% greater than that of the thirteen grinding machines they displaced and effect an economy of operation through lower power consumption. To feed them, three clinker storage silos were built, having a capacity of 3500 bbl. each.

The change of the motive power involved a task requiring a large force of electricians and engineers for months. The most modern equipment for safely handling the heavy current was built into the transformer substation. Each unit of machinery requiring electrical operation is driven by an individual motor, or all sizes up to as high as 650 hp.

Clinker storage of 300,000 bbl. and a giant electric crane with a 100-ft. span and 5-cu. yd. bucket, are other parts of the company's improvement work. The crane has a capacity of 1000 bbl. per hour. Another item is a new feeder system.

In making the vast outlay for improvement, the Coplay company sought to effect economies through efficient operation rather than to increase production.

These immense projects were made without curtailing the daily output by plant workmen under the guidance and direction of the management and staff at Coplay, requiring at times many special expedients to achieve results both of construction and in operation.—*Allentown* (Penn.) *Call.*

White Cliffs, Ark., Cement Project Active Again

ACCORDING to announcement made recently by Thomas L. Dates, who will be general manager in charge of construction work on the new cement plant at White Cliffs, Ark., preparations are being started to begin construction. Mr. Dates is now on the ground, as well as representatives of the Lund Engineering Co. According to Mr. Dates the company has already been financed and the decks are fully cleared for the construction of the plant as rapidly as possible. Perhaps in the next thirty days the work will be getting into full swing. Ordinarily, Mr. Dates said, the time required to complete such a cement plant as will be built at White Cliffs would require 15 months. It is their intention to organize and rush work in such a way that it will be completed and in operation within 12 months.—*Ashdown* (Ark.) *News.*

Homer C. Swearingen

HOMER C. SWEARINGEN, sales manager of the Southwestern Portland Cement Co., died at the home of Mr. and Mrs. Allister Campbell, 511 Cincinnati street, at El Paso, Tex., where he had been for some days with his family.

For more than a month Mr. Swearingen had been sick with a fatal illness to which he finally succumbed. At the time of his death he was president of the Toltec Club, member of the various Masonic bodies, member of the Elks, and a member and officer in the First Presbyterian church of this city. Being on its board of trustees, he was chairman of the house committee.

He was born in Crawfordsville, Ind., July 25, 1884. In 1909 he went to Kansas City, Mo., where he was connected with the old Union Sand and Material Co., later the Missouri-Portland Cement Co. From that time on he remained in the cement business, coming to El Paso in July, 1917, as sales manager of the Southwestern Portland Cement Co., which position he occupied at the time of his death. His father and mother, Mr. and Mrs. J. T. Swearingen of Crawfordsville, Ind., and his sister, Miss May Swearingen, teacher in the Chicago schools, were with him during his illness and at the time of his death.

Mr. Swearingen was one of the most influential and best loved of the younger business men of the city. Everywhere he was popularly hailed as "Homer," and to all his response was whole-hearted in its geniality.

The funeral was held Saturday morning at 10:30 from the first Presbyterian church with the Scottish Rite Masons using the Rose Croix degree and Dr. Poe delivering the funeral address. Interment was at Crawfordsville.—*El Paso* (Texas) *Herald.*

Massachusetts To Have New Quarry Plant

THE Holliston Trap Rock Co., of Holliston, Mass., has been granted a charter of incorporation for the quarrying of stone, sale of granite and trap rock, etc. There is a $100,000 incorporation and 1000 shares of common stock at $100 par.

The incorporators are Frank P. Decrow of Holliston, president, with 166 shares; Leslie A. Eames of Holliston, treasurer and clerk, with 166 shares; Abraham Rosenfeld of this town, with 84 shares, and Benny Rosenfeld of this town, with 84 shares.

The company has a plant for crushing stone on Highland street, Holliston, and began business under incorporation recently.

Officials of the concern stated that about 25 men would be employed, with additional men put on as orders come in.—*Milford* (Mass.) *News*.

A Quarry Specialty Operation in Washington State

By C. W. SMITH

President and Manager, Gem Stone Silica Co., Oroville, Wash.

TO make matters clear as to the designs of this company, I will say its name was derived from the fact it will crush and size some very high grade colored silicous rocks, for terrazzo flooring and stucco-dash stone. One quarry owned by this company contains the gem stone "Thulite" or "Zoisite," bright pink and red, also dark green. There are some eight quarries containing eighteen colors in the rock this company will handle. Until this time the crushing has been done by custom mills; now it is our intention to built our own plant. Its location will be decided soon. It will be either in Oroville or Wenatchee, Wash. If the railroads will allow a coast price freight, using Wenatchee, Wash., as the assembling point and allow the cars to be switched to our plant there (milled in transit, in other words), we will build in the last named place.

The white grade of rock will be silica, marble and limestone; the fines from silica will be used in making silica brick; the dust will be used in spraying walls to reflect light (used mostly by the theaters). Our red coarse-grained magnesite will be similarly used; the fines will be used in making fire brick and furnace linings. The fine dust from our most highly colored rock will be used in coloring cement work, cast-stone facings, etc.; the finest dust from limestone crushing will be used locally as a commercial fertilizer (agricultural limestone).

The plant will have a capacity of six tons per hour finished and graded aggregate for terrazzo flooring; will use crushers, rolls, vibrating screens, with dust collectors. We expect to expand the plant in the near future to include fine grinding and air separation of several other materials. We will handle no sand, gravel or other building materials. The term silica with us means the very high grade white pure quartz.

Hutchinson, Kansas, to Encourage Reopening of Solvay Quarry

THE Solvay Process Co. is getting ready to re-open the limestone quarry at Moline, Kan., an official of the company made known very recently to City Engineer R. B. Lee, of Hutchinson, Kan.

Whether this is one step toward the reopening of operations at the plant here is mere conjecture. But it is known that one of the leaks that led to the soda ash plant being closed here was the loss sustained in operation of the Moline quarry.

It is believed now that conditions are such that the quarry can be operated at a profit, and if that proves to be so it may be one inducement toward re-operating the big plant here.

At any rate Hutchinson is going to give every possible encouragement. City Engineer Lee said that where ever possible the Moline crushed rock, from the soda ash company's quarry, will be used here in construction work, instead of sand or gravel from elsewhere.

The freight rate on the Moline rock is cheaper than on gravel shipped in from Joplin, Mo., the city engineer said, and this Moline limestone is as good as any. It will be specified for use in the paving base for Hutchinson streets hereafter, the city engineer said.

"We want to do everything we can to encourage the soda ash company to re-open the plant here," he added. "This is a small thing, but it will be something we can do to show our interest in the success of soda ash."—*Hutchinson* (Kan.) *Gazette*.

C. L. North Wins Suit For Patent Rights on Cinder-Lime Brick

C. L. NORTH, El Paso, Tex., has won a suit in which the ownership rights to a process of making cinder-lime brick were involved. The other contestant was the Atlas Brick Co., El Paso.

In a previous trial the brick company won. The case was reversed and remanded by the appeals courts. At the trial just closed the retrial jury brought in a verdict holding that Mr. North discovered the process for manufacture of the bricks and is entitled to the patent, said to be worth thousands of dollars.

The brick company sought to show that Mr. North was only an employe of the company, and that the patent belonged to the company.

Limestone Products, Inc., Ocala, Florida

By J. GUY HALL

President and General Manager

WE are incorporated under Florida laws for $160,000. The incorporators and first board of directors are C. W. Cadwell, Windsor, Ontario, and Lakeland, Fla., R. Roy Hall, Sebring, Fla., Ralph S. Hall, Ocala, Fla., and J. Guy Hall, Ocala, Fla. Our present officers are made up from the above group and are, J. Guy Hall, president; C. W. Cadwell, vice-president; Ralph S. Hall, treasurer; and R. Roy Hall, secretary. The writer is also general manager.

We purchased last March from the Ocala Lime Rock Co., 20.9 acres of lime deposits six miles south of Ocala on the Seaboard Air Line R. R. This pit was operated as a road rock quarry at the time it was purchased, but considerable difficulty was experienced by the operators due to the hard crystallized limestone breaking crushers used in the soft rock operation, and they were willing to sell. Of course, the hard limestone is what we want for making lime.

Our deposit was thoroughly tested out before purchasing, by burning and hydrating the lime, and testing for plaster, mortar, and making sand-lime brick, and was found satisfactory in every way. The average analysis is well over 99% pure calcium carbonate.

Our plans call for a crushing plant to produce road rock concrete aggregate in three sizes, and agricultural limestone lump lime and hydrate from a battery of six modern vertical shaft kilns and No. 3 hydrate plant. Our crushing plant building is now being erected.

The company offices are in the Professional Bldg., Ocala, Fla.

The End of One Ohio Portland Cement Project

APPOINTMENT of a receiver for the Western Ohio Portland Cement Co., a Delaware corporation, is asked in a bill filed in Court of Chancery by Frank E. Dodge of Chicago, a creditor of the company in the amount of $10,375 and interest.

The bill sets forth the company was incorporated on March 31, 1924, to manufacture and deal in portland cement and allied products. The complainant states that he has obtained judgment against the company in the United States District Court for the southern district of Ohio, western section, for the amount claimed by him.

Alleging the company is insolvent, the bill states that the company has no real or personal property, is not now functioning, and is making no effort to collect on stock subscriptions that have not been paid for. It is claimed 2650 shares of stock were subscribed for at $100 a share and have been paid.—*Wilmington* (Del.) *Journal*.

States Plan to Spend Billion on Highways in 1927

ROAD construction during 1927 in 47 states will total 26,841 miles and will cost approximately $648,483,000, according to state highway programs reported to the Bureau of Public Roads, Department of Agriculture.

Expenditures of counties and other local subdivisions of government will total approximately $421,000,000 on road improvement, bringing the total well above $1,000,000,000. The full text of the detailed announcement of state plans follows:

The construction of 26,841 miles of road and the maintenance of 239,847 miles are included in the 1927 state highway programs of 47 states, according to reports received by the Bureau of Public Roads. The programs also include the construction of a number of large bridges and the reconstruction of roads previously improved. On account of uncertainty of supporting legislation, no estimate of the season's work is possible as yet in Connecticut.

In carrying out the above programs it is expected there will be expended under the supervision of the state highway departments in the 47 states a total of $648,483,000.

In adition to the state expenditures approximate estimates indicate that counties and other lesser subdivisions of government will expend during the year $475,000,000.

Of the expenditures by the state highway departments of the 47 states approximately $421,000,000 is the estimated amount for road construction, and according to present plans more than $56,000,000 additional will be spent for new bridges. For reconstruction of existing roads it is estimated that the expenditure will be nearly $27,000,000, and for maintenance approximately $126,000,000.

The mileage of new state highway construction contemplated during the year is given below:

Alabama, 406; Arizona, 100; Arkansas, 580; California, 80; Colorado, 124; Delaware, 75; Florida, 775; Georgia, 506.

Idaho, 145; Illinois, 1255; Indiana, 415; Iowa, 1090; Kansas, 1598; Kentucky, 900; Louisiana, 500.

Maine, 414; Maryland, 124; Massachusetts, 240; Michigan, 415; Minnesota, 1007; Mississippi, 524; Missouri, 922; Montana, 251.

Nebraska, 1310; Nevada, 149; New Hampshire, 100; New Jersey, 120; New Mexico, 179; New York, 1006; North Carolina, 650; North Dakota, 1042.

Ohio, 850; Oklahoma, 850; Oregon, 252; Pennsylvania, 1300; Rhode Island, 44; South Carolina, 600; South Dakota, 450.

Tennessee, 529; Texas, 1800; Utah, 100; Vermont, 110; Virginia, 225; Washington, 385; West Virginia, 425; Wisconsin, 1569; Wyoming, 350.

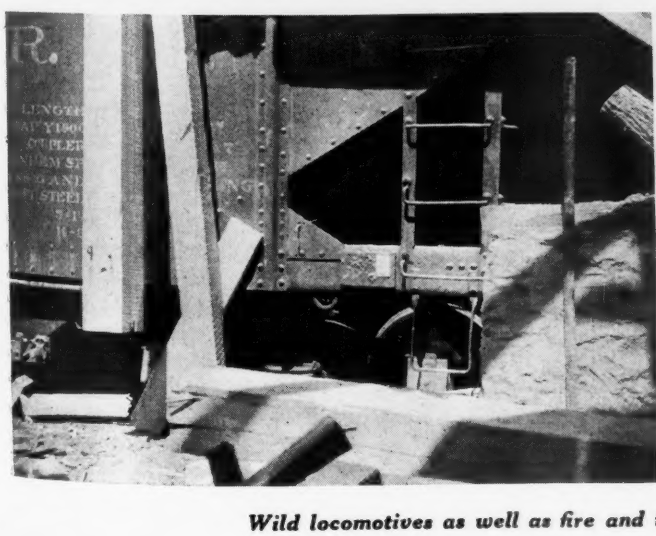
Total, 26,841.

Canada Crushed Stone to Rebuild Plant at Hagersville

PLANS have been prepared by the engineers of the Canada Crushed Stone Corp., Ltd., (the J. C. Buchee Co., Chicago, Ill.) for rebuilding the crushing plant at Hagersville, Ont., which was completely wrecked on August 20, 1926, by a Michigan Central locomotive. What the locomotive did to the plant is shown in the accompanying views.

The new plant will be of timber construction and will have a capacity of from 1,000 to 1,2000 tons per day. Most of the equipment is on hand.

What a Michigan Central locomotive did to the Hagersville plant of the Canada Crushed Stone Corp., Ltd., last summer



Wild locomotives as well as fire and tornados may cause damage to stone plants

Volunteer Portland Cement Co. Plans Early Construction

IT has now been definitely decided to build a cement plant in Knoxville, Tenn. Howell J. Davis, who is looking after the local end of the organizing, informed a Rock Products editor recently that the organization was completed and the financing had been satisfactorily arranged for. About half of the money to be invested has been raised in Knoxville and the remainder outside of Tennessee.

The new company is called the Volunteer Portland Cement Co. and has been incorporated in Delaware and registered in Tennessee. The president is J. Ross Hanahan and Mr. Davis is the vice-president. The other officers and directors are not announced. Major F. H. Lewis, who is now in charge of the improvements being made by the Coplay Cement Manufacturing Co. (in the Lehigh Valley), is the company's consulting engineer.

The wet process will be used and marble, or limestone, and shale will be the raw materials. The company has large deposits of these on the land on the edge of the city of Knoxville, which it recently acquired.

Asked about the possible market, Mr. Davis said that a careful survey had been made before deciding to build a plant. This survey showed that about 300,000 bbl. were used yearly in the Knoxville district. In addition, there is a large potential market in both North and South Carolina which the new plant will be able to supply. Many new hydro-electric developments are planned for places within the shipping radius of the proposed plant.

Minnesota Town Would Control Operation of Pits

THE provisions of a gravel pit ordinance recently adopted by the New Ulm (Minn.) city council may be of interest to road builders in other parts of the state. The city attorney who drafted the ordinance stated that no city in the United States could be found that has any regulations covering this matter, and the ordinance is therefore unique.

Persons applying for permission to open gravel pits within the city limits must give a surety bond, to safeguard the city in case of accidents. The pit must not come within six feet of any city property, and must have a 45-deg. slope to prevent cave-ins. The gravel pit must be surrounded with a substantial fence, it must not be dug more than 40 ft. deep, and must not be dug under any city property. The surface dirt or strippings must not be placed on city streets or alleys.

The fact that the city council found it necessary to take steps to prevent encroachment on city streets is another sign of the coming shortage of gravel conveniently available for street and highway surfacing, says a state highway department bulletin, and it emphasizes the wisdom of paving thoroughfares where traffic is so heavy that gravel is worn away rapidly.

A similar note of warning is seen in the annual report of C. W. Anderson, highway engineer of Lyon county. Within five years, he says, the county, whether it likes it or not, will be engaged in hard-surfacing some of its roads. At present 10,000 to 15,000 cu. yd. of gravel must be replaced per year, close haul gravel deposits are nearly exhausted, and maintenance costs are increasing annually. In places patrolmen are replacing about 120 cu. yd. per mile in a year, while traffic is destroying 250 cu. yd.—*Renville* (Minn.) *Star Farmer*.

Portland, Oregon, Gravel Producer's Property Condemned

AFTER a trial lasting almost two weeks, a jury in Judge Ekwall's court returned a verdict awarding the Columbia Digger Co., Portland, Ore., $101,470 for their river-front property which was condemned by the city for the purpose of erecting the pumping plant of the intercepting sewer in the $3,000,000 Laurgaard waterfront project.

The city offered $52,000 for the property and the company appealed, asking $175,000. The award of the jury includes the docks, bunkers, crane and real property.

The testimony for the plaintiff proved the land worth approximately $1.50 per sq. ft. and the testimony for the defendant proved the property to have a value of $4 per sq. ft.

There was some contention on the part of the city that the revolving unloading crane was personal property and not a part of the real estate. Judge Ekwall held, however, that the crane was part of the real estate and must be taken with the land.

The property is located at the foot of Ankeny street, with 145.15 ft. on the river 155 ft. on the Burnside bridge, 146.38 ft. on the west and 122.6 ft. on Ankeny street.

The Columbia Digger Co. had not yet decided where they will construct new bunkers to carry on their sand and gravel business when this report was received.

Los Angeles Concern Turns Out New Type of Wall-Board

MARKING another step in the invasion of distant markets by Los Angeles products, approximately a trainload of a newly perfected type of wall-board was shipped from the factories of the Plastoid Products Co. recently, destined for distributing centers in California and adjoining states, company officials reported.

The shipment comprised the initial orders placed by building material dealers for the new mineral-base wall-board, claimed to be an innovation in the construction field, according to R. M. Greenleaf, vice-president and general manager of the concern. The product aroused national attention among leading American manufacturers three weeks ago, Mr. Greenleaf declared, when a demonstration of the properties of the material was carried out in Chicago by Orville Routt, president of the firm. Many of those manufacturers, he stated, are now producing mineral lath with equipment perfected by the Plastoid company and leased to them under a royalty arrangement.

The new wall-board, perfected after years of research work in the firm's laboratories, is asserted to be waterproof, fire-resistant, soundproof, and impervious to climatic changes. The company's sales registered an increase of 33 1-3% over those for the corresponding period in 1926, a report covering operations for the first two months of the current year revealed.—*Los Angeles* (Calif.) *Examiner*.

More than 22,000,000 Motor Vehicles Registered in 1926

MORE than 22,000,000 motor vehicles were registered in the United States during 1926 according to reports received from State registration agencies by the Bureau of Public Roads of the United States Department of Agriculture. The year's registration represents an increase of 10.3% or slightly more than 2,000,000 more than that of 1925.

Florida with an increase of 40.2%, not including nonresident registration, shows a greater gain than any other state. Oklahoma, with a gain of 17.8%, and second only to Florida in respect to the amount of increase, was followed closely by Alabama, Idaho, Louisiana, Mississippi and Utah, all of which had increases over 15%.

Of the total number of vehicles registered, 19,237,171 were passenger automobiles, taxis and busses and 2,764,222 were motor trucks and road tractors. The increase in motor trucks and road tractors amounted to 13.2%, which is somewhat greater than the increase for all classes of motor vehicles, indicating a continuation of the development of commodity transportation by highway.

Receipts from registration fees, licenses, etc., amounted to $288,282,352 as compared with $260,619,621 in 1925. Of the gross receipts $190,406,060 was available for highway construction under the supervision of the state highway departments, $51,702,184 was allocated to countries for expenditure on local roads and $25,274,158 was used to finance highway bond issues. The remainder was used for payment of collection costs and miscellaneous purposes.

Therefore the prospect for highway improvement in 1927 looks good.

J. J. Urschel Buys Control of the Woodville Lime Products Company

CONTROL of the Woodville Lime Products Co., at a price reported to be in the neighborhood of $1,000,000, was acquired on March 16 by J. J. Urschel.

The acquisition marks the end of litigation for control that has extended over a period of several years in and out of county and state courts.

Mr. Urschel started the plant in 1901, after having been engaged in sales work. A few years later John Urschel, father of the founder, and D. F. and William Urschel, brothers, joined the organization.

The company now operates 53 kilns and owns more than 500 acres of stone land. Mr. Urschel is vice-president of the Valve Bag Co., which he organized, is president of the Automat Molding and Folding Co., and occupies a like position in the Madison Motors, Inc.

The offices of the lime company are at 622 Madison Avenue, Toledo, Ohio.—*Toledo News-Bee.*

Charles E. Proudley Joins Staff of National Sand and Gravel Association

ANNOUNCEMENT has been made by the National Sand and Gravel Association of the appointment of Charles E. Proudley as joint assistant to the executive secretary and to the director of the engineering and research division.

Mr. Proudley has been with the United States Bureau of Public Roads since 1915, except for an interruption during the World War, when he served in the field artillery of the A. E. F. He entered the service of the Bureau after a brief employment with the cement division of the United States Bureau of Standards. Upon his return from war service he again joined the staff of the Bureau of Public Roads and from 1921 to 1925 was in direct charge of non-bituminous road materials testing and research. Later he was placed in charge of the concrete research laboratory of the bureau, with the title of assistant engineer of tests. He occupied this position until he severed his connection with the bureau to accept employment with the National Sand and Gravel Association.

Mr. Proudley was born in Washington, D. C., August 7, 1897, and received his education in civil engineering at George Washington University of this city. He is the author of several papers dealing with concrete and concrete materials and is a member of the American Society for Testing Materials.

The addition of Mr. Proudley to the staff of the National Sand and Gravel Association will increase greatly the value of the work of the organization to its members, and it marks a continuation of the policy of the officers of the association to emphasize that the organization is devoted principally to furnishing personal service to its membership. This policy has met with such a gratifying response from the members that it became necessary to increase the staff of the association in order that the

Charles E. Proudley

healthful growth of the personal service idea might not be handicapped in any way.

Mr. Proudley is author or co-author of several papers treating of various phases of concrete work, among which are the following:

"Effects of Alkali on Strength of Mortar," published in *Public Roads,* May, 1924.

"Dependability of Organic Matter Test of Concrete Sands," published in *Engineering News-Record,* October 12, 1922.

New Lime Plant at Ogdensburg, N. J., Near Completion

THE new lime plant of the New Jersey Lime Products Corp., Ogdensburg, N. J., of which Richard K. Meade & Co., Baltimore, Md., are the engineers, is now nearing completion and, it is anticipated, will be burning lime about June 1.

The present plant will employ a rotary kiln and will be the first unit of what is destined to be one of the largest lime plants in eastern Pennsylvania.

Its raw material consists of a very pure calcite. On burning, the latter falls to granules, so that the lime will be in the granular condition so popular with the eastern trade. The plant will also be equipped to manufacture pulverized lime.

The equipment is thoroughly modern and up-to-date. In order to produce the very best quality of lime, oil will be used for fuel and the raw materials will be under the constant supervision of Richard K. Meade & Co., who will act as consulting engineers and chemists after the plant is placed on an operating basis, this summer.

This company has now in operation a pulverized lime plant and is also prepared to furnish pulverized limestone for agricultural purposes, asphalt filler, etc. The capacity of the lime plant will be 60 tons per day.

Lime in the Treatment of Industrial Wastes

THE program of the spring meeting of the American Chemical Society to be held in Richmond, Va., April 11 to 16, will include a symposium on lime, a discussion of the very timely problem of the treatment and disposal of industrial wastes. Health authorities throughout the country have had enacted laws prohibiting the pollution of streams, and state and federal officials are more and more actively enforcing these laws. Practically all industrial plants have effluents and sludges which must be disposed of, and few are so fortunately situated as to be able to discharge these into streams without treatment.

In many sections the problem has become quite acute and extensive efforts are being made to devise methods for the treatment of the various effluents. The investigations include tests of treatments for wastes from steel mills, coke and gas plants, dye and textile mills, tanneries, creameries and canneries. In many instances the problems involved have included preservation of fish life in the streams as well as protection of the water supplies and the elimination of nuisances along the waterways.

The boards of health of many of the states are co-operating with many of their industries, and in a number of these states associations of the local manufacturers in the individual lines are undertaking co-operative investigations. In Wisconsin a very extensive series of tests, looking toward the disposal of cannery wastes, were conducted during the past year by the State Board of Health in conjunction with the Wisconsin Canners Association, which is doing everything in its power to co-operate with the public and sanitary officials. In this case a lime and iron treatment proved most satisfactory.

These tests, among others, will be described at the society's symposium by L. F. Warrick of the Wisconsin Board of Health, and other sanitary engineers and chemists will participate in the discussions. The industrial waste problem will undoubtedly be of interest to all those attending the symposium. Other papers on the slaking and handling of lime will also be of importance in this connection.

Prof. J. R. Withrow, head of the chemical engineering department, Ohio State University, is in charge of the preparation of the symposium and will preside during the sessions.

Michigan Governor to Check Sonntag Cement Plant Report

A CHECK against a recent report on the Chelsea cement plant made by C. H. Sonntag, cement engineer, has been ordered by Governor Green of Michigan, according to an Associated Press dispatch from Lansing, dated March 15. A national appraising firm has sent men to the plant. A report is to be prepared and will be submitted to the legislature.

Mr. Sonntag in his report declared much of the equipment is junk, costs are excessive, low grade cement has been produced, and cautioned the state it should not continue the state-owned industry unless it can use the product for state work "at a distinct saving over the open market."

Dolomite Products Company Plans to Use Gas Well

SINCE publishing the news item on the bringing of a natural gas well in the quarry of the Dolomite Products Co., near Rochester, N. Y., in ROCK PRODUCTS, March 19, p. 86, we have received the photographs which accompanied the original story in the Rochester *Democrat and Chronicle*. These are reproduced herewith.

John H. Odenbach, president of the Dolomite Products Co., near Rochester, N. Y., inspecting a gas well drilled in the floor of his quarry for "drainage" purposes

John H. Odenbach, president of the Dolomite Products Co., writes: "We are at present redrilling the hole so as to insert a larger casing, and every indication points to a goodly flow of gas after we have drilled lower into the Medina sandstone. It is our intention, if the gas supply is sufficient, to purchase eequipment to make all our power requirements, and in addition do all of our heating during the winter months of operation."

It should be added that the heating requirements are not for the stone plant, but for an office building and employes club house that the company is erecting.

Water and gas coming out of the drill hole

Gas burning—It was discovered accidentally by a discarded match

Quarry Superintendent Heads Americanization Work

ONE of the most unusual commencements in the history of educational activities in Blair county was held in the office building of the St. Clair Limestone Co. at Ganister, Penn., March 1. Twenty foreigners, enrolled in an Americanization school, conducted by the officers of the company, were the graduates, each being presented a certificate and a silk American flag.

The St. Clair company is a subsidiary of the Carnegie Steel Co. and operates large quarries at Ganister, this county. Many of the employes are of foreign birth and knew little of the English language, of American customs and ideals. They, however, have manifested a strong desire for training in Americanization, and last fall R. E. Larry, superintendent of the quarries, decided to start a class.

He became the chief instructor, other employes assisting. School was held two evenings each week. The ages of the men ranged from 21 to 44. Included among the guests at the commencement were District Attorney Marion D. Patterson, William Bice, for many years superintendent of the quarries, and Ira Stiffler, a foreman.
—*Pittsburgh Press.*

National City Bank's Analysis of the Cement Industry

THE March Bulletin of the National City Bank, New York City, summarizes present conditions in the portland cement industry, in part, as follows:

"No other comparably finished product and requiring so large an investment in proportion to the value of the product is sold at so low a price per ton or per pound as portland cement.

"A cement mill making a million barrels, the equivalent of 375,000,000 lb. of cement, should have received for its product in 1925 (average for the country) $1,700,000 net. This does not include packages or transportation charges. Such a plant properly equipped, with reasonable working capital and free from debt, would represent an investment of about $4,000,000. On this basis it would require over two years for a single capital turnover.

"This suggests a sound economic reason for the present drift toward combinations of cement mills similar to what we have seen in many other industries. Obviously the proportionate overhead saving is greater in the cement industry. Such combinations of mills strategically located are also important for the saving of transportation charges. The percentage of mill price is practically never less than 10% and averages about 20%. The savings in avoidance of competitive 'cross shipments' may mean the difference between a profit and a loss.

Industry Makes Great Engineering Progress

"The industry has made great engineering progress in recent years. For example, the records of one of the important companies show that in 1925 it produced 1000 bbl. of cement with 561 man hours of labor, while in 1921 to produce the same amount of cement required 739 man hours, and in 1919, but slightly better than the averages for the 836 man hours. These figures probably are but slightly higher than for the industry as a whole, and they come from a larger investment in equipment and of course do not represent net gain. Power-driven equipment involves heavy depreciation costs, and the average of all wages is much higher than when a larger proportion of unskilled labor was employed.

"The estimated present capacity of the country's cement plants is approximately 200,000,000 bbl. annually, and if proposed mills from Maine to Louisiana and from the Great Lakes to Mexico are added the increase will be about 8,000,000 bbl. This would mean an excess of capacity over present requirements of about 20%, and so distributed as to assure abundant competition in every section.

"Although the use of cement has increased rapidly, the consumption has been to a very great extent financed by the borrowing power of states and municipalities, and it may be questioned whether such borrowing will continue at the same rate, in view of the rising protest against increasing taxation. Furthermore, many local governments will require to have their debt limits revised if they are to continue expenditures on the past scale. Another feature which the industry complains of as disappointing is the slow rate of substitution of portland cement concrete for less permanent building materials.

Tendency to Overexpansion

"At present the cement business seems likely to afford another illustration of the tendency to overdo every growing industry. Of late the Southeastern States have been leading in this expansion. The productive capacity of cement mills in and south of the states of Virginia and Tennessee is now 15,746,000 bbl. These mills shipped in 1925, 13,048,000 bbl., while they produced 13,506,000 bbl. The actual distribution of American production in the nine states in this territory was 16,533,920 bbl., in addition to which 1,219,500 bbl. of imported portland cement were received at South Atlantic and Gulf ports east of and including New Orleans. These figures indicate that there were shipped in this territory in excess of 2,000,000 bbl. from northern and western mills. Virginia has two cement plants, located, one in the extreme southwestern part of the state and one in the extreme southeastern. Owing to their location, the northern portion of the state is largely served by northern mills, outside of the territory in question.

"All of this territory is competitive ground for foreign cement, of which the total importations into this country in 1925 were over 3,500,000 bbl. There is no import duty on cement. It is estimated that the increase of manufacturing capacity will bring the production of these Southeastern States to about 17,000,000 bbl. in 1927, while there is little likelihood that the consumption in that territory of American product from all sources will come within a million barrels of that figure.

"There are similar situations in other parts of the country, although perhaps no other quite so extensive. Other industries, however, have done and are in danger of doing the same thing, and it is well to note that developments of this kind are what make the business cycle. So long as the industries are kept in a good state of equilibrium prosperity will be maintained. Overdevelopment ties up capital in idleness, produces short time employment and slows down the movement of general business."

New Michigan Foundry Sand Operation

OFFICERS of the Nugent Sand Co., owners of Pigeon Hill, Muskegon, Mich., have formed a new corporation to be known as the West Michigan Core Sand Co. to deal in sand, do construction work, operate warehouses, issue bonds and exercise all the powers conferred by the laws of Michigan on such an organization.

Corporation papers have been filed in Lansing with the Michigan Securities Commission, placing the capitalization of the company at $225,000. Those interested in the corporation are Coleman C. Nugent, Fritz Meeske and Otto W. Meeske.

The company's right to purchase the hill and remove it was bitterly contested in the courts with the result that the case was finally decided in circuit court in favor of the company and the Pere Marquette railroad which is extending its tracks to the hill.

While definite plans have not been announced, it is understood that the company plans to develop the entire territory after Pigeon hill and other smaller mounds of sand in that locality have been removed. It is the plan to make the property lying between Muskegon lake and Lake Michigan into one of the most attractive waterfront resort properties near Muskegon.

South Carolina Proposes Tax on Cement

A TAX of $1 a ton would be levied on cement under a bill thrown into the hopper of the South Carolina house of representatives by Representatives P. B. Finklea of Florence and J. E. Harley of Barnwell. The authors estimated the tax would raise $150,000 a year, half of which, it is provided, would go to the counties in which the cement is sold.

The bill was referred to the ways and means committee.—*Columbia* (S. C.) *State.*

Increases Line of Storage and Handling Equipment

R. H. BEAUMONT CO., Philadelphia, Penn., announces that it has taken over the business of the American Manufacturing and Engineering Co., Kalamazoo, Mich., and products formerly manufactured by this company, including the "American" slack line cableway excavator, will now be manufactured by the Beaumont company. S. O. Nafziger, president of the American company, will be associated with the Beaumont company.

The addition of the "American" cableway excavator to the Beaumont, which already includes a drag scraper, completes a full line of equipment for elevation and storage of sand, gravel, stone and like materials. The company will sell the complete system for this service, including the hoist.

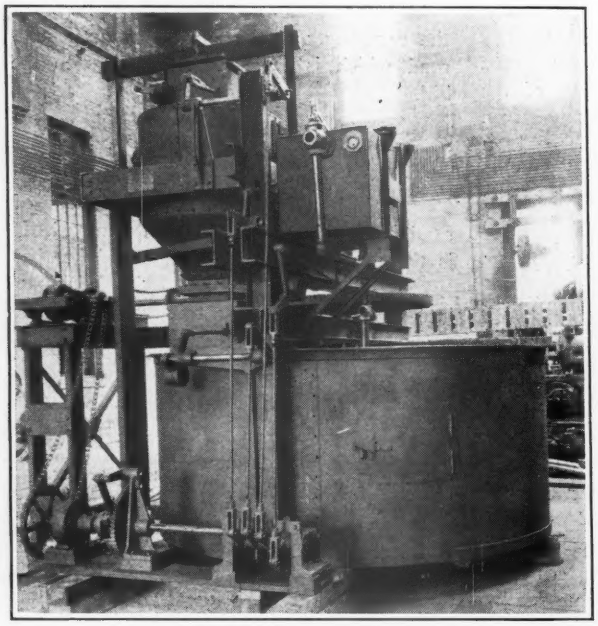
New Machinery and Equipment

New Automatic Continuous Lime Hydrator

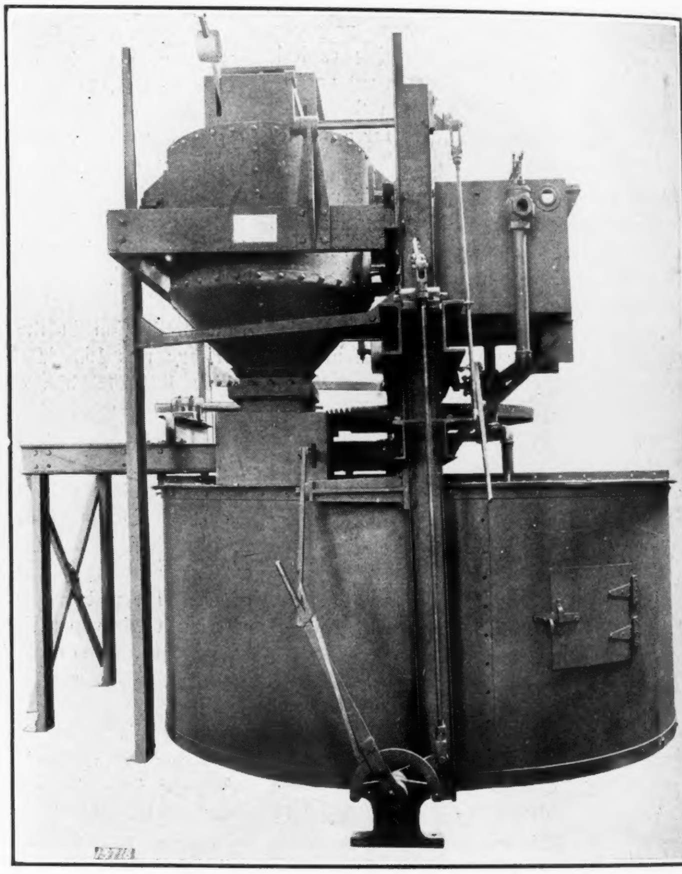
A NEW lime hydrator, automatic and continuous in operation, has been brought out by the Vulcan Iron Works, Wilkes-Barre, Penn. The new machine is said to have all the advantages claimed for the batch system to which have been added features of mechanical and continuous operation. These have been accomplished by a timing device on the new hydrator through which means all the necessary operations are said to be carried out in sequence. In operation, the lime is weighed, the water measured, the two placed in the hydrator, worked a predetermined time until hydration is complete, discharged from the hydrator and sent to the grinding mill by means of mechanical devices, with only an occasional inspection by the plant superintendent, according to the manufacturers.

The operation is described by the manufacturers as follows: The quick lime flows by gravity from an overhead bin to the scale hopper through an automatically controlled gate and is weighed by means of a self-acting scale. The water is measured accurately and automatically by a system of float and valves. Starting the operation with the empty hydrator, the lime and water measured as above, are dumped into the pan and here the hydrating is done by kneading and mixing the lime and water for a predetermined time, usually 10 to 15 minutes. After hydration has been completed, the timing mechanism discharges the hydrate into a bin or hopper below the pan, from which it is taken to a grinding mill. The timing mechanism can be regulated both as regards length of each operation as well as changes in operation while the hydrator is in operation.

The proper proportions of lime and water are determined by a few trial batches and remains fixed except where the character of the lime changes greatly from the average. The slaking process can be watched during the entire period by means of large doors in the casing. By thus keeping the condition of the hydrate in view an improperly mixed batch is apparent before the material has left the hydrator and the superintendent can at once make arrangements for changing the amounts of water or lime during hydration.



Left—Continuous, automatic lime hydrator. Right—Hydrator with automatic features removed for hand operation



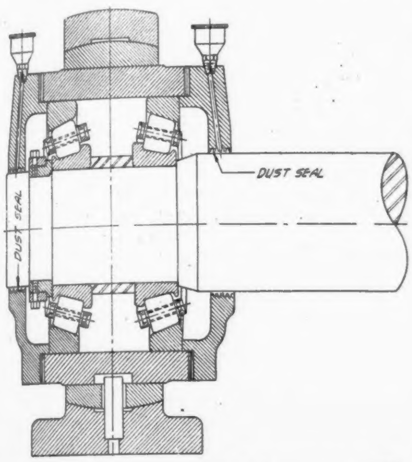
The supporting structure is of structural steel, braced and bolted. Parts liable to leak dust are enclosed in a dust-proof case. The power requirements are about 7½ h.p., obtained either by electric motor or a line shaft. Provisions for lubrication of moving parts have been made. The capacity of the hydrator is said to be about 5 tons of hydrated lime per hour, based on a hydrating time of 10 to 15 minutes. The hydrator is also made so that it can be operated by hand, the automatic features being replaced by hand levers, conveniently located so that the operator does not have to leave his position for any of the operations or to inspect the hydrator.

New Hammer Mills With Roller Bearing Mountings

THE Bonnot Co., Canton, Ohio, has just placed on the market a new line of swing hammer mills which are said to embody several new features of design in crushers of this type. One of the great improvements, according to the manufacturers, is the adoption of Timken roller bearings of the heavy railroad type as mounting on the main shaft of the crusher. These bearings are all said to be of sufficient size to take all the shock which swing hammer mills are subject to, without danger of injury. These bearings are also claimed to reduce the power requirements of the crushers.

Special precautions have been taken in the design of these bearings to make them as dust-proof as possible, the manufacturers say, four large grooves on each side being provided, as well as grease cups. The grooves are kept full of grease at all times.

Dust to reach the bearings would have to work through these grease rings, which is not possible, the manufacturers say, for the grease is always working outward or constantly pushing the dust away from the bearings. Grease for the bearings is pro-



Roller-bearing mounted hammer mill

vided through connections, the grease grooves having no connection with the lubricating of the bearings.

The breaker plates are of manganese steel, adjustable to take up wear, and reversible. The main shafts are of forged steel, heat treated. Liner plates are of manganese steel and the hammers on the smaller type mills are of carbon tool steel, tempered on the wearing ends. The larger size crushers are equipped with manganese steel hammers of the slugger type. The crusher frames are of heavy plates, riveted with provision for tramp iron entering the mill.

Several different sizes of these crushers are offered. The smaller are for production of agricultural limestone, etc., with rated capacity of 5 to 20 tons per hour. The largest size will reduce stone of 20-in. diameter to ¾-in. and less, and is designed for cement mill operation, feeding the Compeb mill in one operation, it is said. The capacity is given at about 300 tons per hour. The drive for all types is either by direct connection with electric motor, for which Hayward couplings are furnished, or from a line shaft.

New Continuous-Type Wet-Mixer for Gypsum Products Plants

A CONTINUOUS-TYPE of met-mixer for use with different designs of gypsum plant equipment is announced by the Her-Born Engineering and Manufacturing Co., Sandusky, Ohio. The machine is made in three standard sizes and can be adapted, the manufacturers, say, for use in paved gypsum construction, substituting for the usual mortar box. The general over-all dimensions are given as about 6 ft. and the No. 3 size, recommended by the manufacturer for plaster board and gypsum block machines, weighs about one ton.

Under the new process, the plaster goes into the cylinder in a continuous stream, likewise the water. The consistency is regulated by the water flow at the regulating valve. The material is caused to climb up the side of the cylinder by centrifugal force and is dropped down again by gravity, by means of a non-corroisve scraper held in position by spring tension on the upper segment of the cylinder. The general slope of the mixing cylinder causes the material to be dropped forward each time and when discharged is said to be thoroughly mixed. The device has no propellors, blades or similar contrivance which might allow the material to collect. The process is made possible, the makers say, by the high periphery speed at which the cylinder rotates.

To Manufacture Gravel Plant Equipment

ANNOUNCEMENT has just been made by Hetherington and Berner, Indianapolis, Ind., of the completion of plans for manufacturing a complete line of gravel producing equipment. This new manufacturing policy marks a forward step in the progress of the company, established over 60 years ago. In addition to manufacturing its line of sand and gravel pumps, the company operates a large foundry and several steel fabricating plants.

The new program will co-ordinate the activities of its plants and feature the production of rock products equipment. This includes gravel bins, "A" frames, masts, barges, etc., all of steel construction. The barges will be shipped either assembled or knock-down. Steel boxes, suction cages and special valve and eblow equipment will also be manufactured, it is announced. The present line of pumps will be extended.

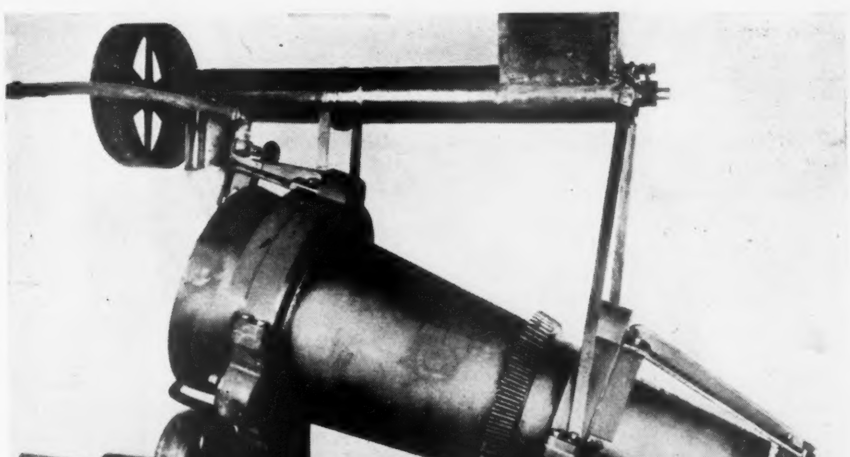
Small Power Shovel for Stock Loading

A NEW small gasoline shovel of the full revolving type is soon to be marketed by the Burch Plow Works Co., Crestline, Ohio. The machine can be used for loading to and from stockpiles, car loading and for other purposes where larger shovels are not

New full-revolving gasoline shovel

desirable. It is designed to carry a ⅜-yd. bucket.

The machine is mounted on a McCormick-Deering tractor, equipped with full crawler treads. The circumference of the swing is said to be 27 ft. and only a 9-ft. clearance required for lifting and unloading. The shovel will dig 2 ft. below the surface on which it is standing, the manufacturers say. Construction is said to be simple and substantial and all control levers within the reach of the operator.



New continuous-type wet-mixer for gypsum plaster

L. L. Griffiths Defends Michigan State Cement Plant Adminstration

THE EDITOR—On the writer's return from two weeks' absence, he has brought to his attention your article, "State Cement Plants—For Peace and Good Will Among Citizens, May They Cease To Be!" in the March 5 issue of ROCK PRODUCTS.

You have reprinted at great length some newspaper clippings of malevolently untrue, biased and inaccurate statements and reports, which have appeared in the press from time to time, but you have not to date seen fit to print other press reports which have appeared, giving true statements and facts relative to the Michigan state cement industry, and the writer's direction and management of it. There are always two sides to every question, and the writer requests, in justice to him and his associates, that you give equal publicity to this letter and the enclosures, which are true facts and of record in the state files.

The writer took over the operation of the Michigan Portland Cement Co.'s properties on March 15, 1921. Prior to his connection, this company's best year had been 1920. With the same equipment and personnel, excepting three changes in the latter in 1922, and a number of changes in 1924, due to the use of inmate (convict) labor, the writer's management and direction produced the results tabulated below for the period 1921 to 1926, inclusive:

Year	Kiln Days	Barrels per Day	Burned Year	Barrels Ground	Barrels Shipped	Average Bin Cost	Av. Sales Price Gross	Gross Profit per bbl.
1920	323	1024	330,930	302,309	299,681	$2.142	$2.729	$0.587
1921	276	1781	492,233	481,212	481,034	1.519	1.884	0.365
1922	250	2110	527,544	537,070	527,797	1.554	1.870	0.316
1923	275	2250	619,014	591,512	585,381	1.459	1.950	0.491
Following operation as Michigan state cement industry.								
1924	251	2172	545,705	499,555	458,393	1,268	1.930	0.662
1925	211	2122	447,773	457,559	379,320	1.305	1.887	0.582
1926	301	2265	681,776	724,520	652,913	1.241	1.762	0.521

After deducting the usual 10 cents per barrel on each barrel shipped, wages paid guards and inmates used institutionally and power, heat and light used institutionally, an audit dated October 24, 1924, by Parker and Davidson, for period December 1, 1923, to September 30, 1924, shows net profit from operations $145,137.58

Evans Audit Co. for period October 1, 1924, to December 31, 1926, shows net profit from operations 332,632.16

Total net profits from operations period December 1, 1923, to December 31, 1926.... $477,769.74

An inspection of the U. S. government income reports will show that the Michigan Portland Cement Co. paid taxes on net earnings for the year 1923 after deducting $47,374.54 depreciation. These facts rather repudiate some of the statements you have printed.

Coats and Burchard Co., appraisers and engineers, 844 Rush St., Chicago, a nationally known concern, after six weeks' very thorough work reported net sound values of the properties, industrial and institutional as of Novmeber 30, 1926, as being $1,301,855.02. The state has invested in these properties, $500,000 purchase price, plus $255,499.90 expended in improvements and betterments, making a total of $755,499.90.

The writer further encloses for your information and use a copy of his letter of March 11 to C. H. Sonntag, which answers many inaccurate and misleading statements of Mr. Sonntag's report as given in the press articles.

The writer would also refer you and your readers to the February 17, 1927, issue of the publication *Michigan Roads and Pavements*, Lansing, Mich., which gives State Highway Commissioner Frank F. Rogers and Deputy Commissioner-Chief Engineer G. C. Dillman's report on the quality of the cement manufactured at this plant. This he quotes in part below:

The testing of all Michigan cement for state highway purposes has been handled by our highway testing laboratory and branch office established at the Chelsea plant. We have had from two to four laboratory men at the plant during each construction season. For the past year the state highway testing has been done in a separate building equipped as a laboratory assigned for the use of our men. The employes in our branch laboratory are absolutely independent in every way from the cement plant organization. During the summer months these men worked 10 hours a day and two of them usually worked on Sundays.

In 1924 the Michigan cement plant began to operate as a prison industry and during the season approximately 2000 samples of cement were tested by our laboratory; reports show that there were seven failures on 7-day tensile strength, no failures on 7 and 28 days, and two 28-day failures after passing all previous tests. (Approximately 400,000 bbl.)

In 1925 our laboratory made 1692 7-day strength tests and 1688 tests of 28-day strength. There were five 7-day strength failures, representing 0.3% of the total 7-day tests made, and there were no 28-day strength failures. (About 345,000 bbl.)

During the year 1926 the state highway laboratory tested 5057 samples of portland cement, of which 61.32% of the samples (3100) represented Michigan cement. . . . Of the total number of tests made, including fineness, soundness, initial and final time of set, 7-day and 28-day tensile strength, 1.8% of the Michigan cement samples failed to meet the standard specifications. No 28-day tensile strength failures. (Michigan cement tested approximately 620,000 bbl.) Compared to this we find one brand of cement with 25% of the samples failing, another brand with 14.3%, an unknown brand 2.5%, one brand 1.3%, one brand 0.5%, another brand 0.3% and 10 brands with no failures. It is interesting to note that the 10 brands with no failures represent but 22.92% of the samples tested, whereas the other seven brands used, having more or less test failures, represent 77.08%.

The foregoing absolutely proves the fallacy of the statements made in the press and by some of the orators of the present administration during the campaign and since.

The writer is not here entering into any defense of the principal of state-owned and operated industries, but your editor's note in this article above referred to is incorrect in some respects. It states, "Our purpose in republishing all these newspaper reports of the Michigan state cement plant scandal is threefold." You have not published *all* the newspaper reports, but have published a selected few, giving only those condemning the plant.

The second paragraph of the editor's note states: "That irrespective of the truth or accuracy of the charges made against the management of this plant, the publicity given these charges may serve as a warning to self-respecting cement men of the dangers to their reputations by acceptance of political jobs of this kind under politics as at present practiced." The writer has been engaged in industrial engineering for the past 25 years, successively and successfully, as designing, constructing, testing and erecting engineer; assistant superintendent, superintendent, general superintendent, manager and director of industrial operations; and his ability, qualifications and integrity have in all of his past connections been thoroughly proven and substantiated, as is evidenced by the qualified and disinterested expressions in the photostat copies of the several letters, from former associates, superiors and clients which he encloses for your information and use. There are a large number of "self-respecting" professional men who are employed by the federal government, state and municipal governments, such as lawyers, doctors, accountants, civil, electrical, mechanical, mining and industrial engineers, and he fails to understand wherein these political connections are and should be restricted to men who have no self-respect.

It is, however, true that utterance and publication of some selected statements and reports, and the suppression of other statements and reports relating to and bearing on the same question or condition, is damag-

ing and prejudicial to question, condition and individuals involved, and the writer trusts the spirit of fairness and honesty which he has every reason to believe prompts and directs your activities will cause you to give him the representation requested.

L. L. Griffiths,
Ann Arbor, Mich.

March 23, 1927.

The photostat copies of letters enclosed include those of Mark Merriman, chairman of the Michigan State Prison Commission, outlining Mr. Griffiths' duties and responsibilities; from N. S. Potter, Jr., president of the Michigan Portland Cement Co., commending Mr. Griffiths services; from C. A. Tupper, president of the International Trade Press, Inc., publishers of *Cement, Mill and Quarry,* highly commending Mr. Griffiths to the promoters of the Bankers Portland Cement Co., "which is organizing to build a much-needed cement mill at Panther, Va."; from the secretary-treasurer and others of the town of Montreal East, Que., commending Mr. Griffiths' "superfine work" in the Canada Cement Co., Ltd., valuation case; from W. H. Harding, president of the Whitehall Cement Manufacturing Co., recommending Mr. Griffiths as a "first-class mechanical engineer"; from N. M. Clark, secretary of Henry R. Worthington, congratulating Mr. Griffiths on entering the consulting engineering field; from F. R. Bissell, president of the Texas Portland Cement Co., accepting Mr. Griffiths' resignation as general superintendent and retaining his services as consulting engineer; from John H. Lober, president of the Vulcanite Portland Cement Co., stating that there should be no doubt of Mr. Griffiths' success as a consulting engineer, and offering to assist him in securing retainers. These letters are dated from the most recent (the first refered to) in 1923 to the last few dated in 1911. The letter to Mr. Sonntag covers much the same ground, but in more retail, as in the letter to the editor.—The Editors.

Florida Rock Producers to Ask State Protection

AN editorial in the *Tribune* of Tampa, Fla., states:

"Florida produces quantities of rock suitable for use in road building, which should be used more extensively, instead of shipping rock from other states. There are at least six large rock plants producing just as good material, both flint and lime, as the outside product. Three large plants are near Ocala. One at Brooksville has just installed machinery costing $60,000.

"Those interested in the promotion of this important home industry have prepared a bill to be introduced at the next legislature, to provide:

"Such official board in the state of Florida, whether of the state of Florida, a county, or municipality, which may be charged with the duty of constructing public roads, highways and bridges, shall give preference to the purchase of all materials and in letting contracts for the construction of such roads, highways and bridges, to material produced within the state of Florida, whenever such material can be purchased at no greater expense than that which would obtain if purchased elsewhere, and it shall be the duty of the said official boards in the selection of material for said uses to compare the quality, fitness and prices of material produced within and without the state of Florida, in their consideration of the purchase and use of such material."

Cleveland Plant of the Universal Cement Awaits River Straightening

PLANS for the new Cleveland plant of the Universal Portland Cement Co., subsidiary of the United States Steel Corporation, were discussed recently by Blaine S. Smith, of Chicago, vice-president and sales manager of the company, and the law firm of Squire, Sanders & Dempsey, Cleveland, Ohio.

Mr. Smith announced that a sketch of the completed plant, which will have an output of 1,250,000 bbl. of cement a year, is now being drawn. The plant will be located on property now owned by the company in the Cuyahoga valley, near the Otis Steel Co. mills.

The tract on which the plant would be erected is a cul-de-sac, providing only one outlet to streets in the flats and being bordered on three sides by the serpentine Cuyahoga.

Methods for clearing up the "jungle," as Mr. Smith characterized the property, were discussed by him and the attorneys. The company has been postponing its plans for building, Mr. Smith said, pending definite declaration by the city of its program for river straightening.

Should City Manager William R. Hopkins' plans for the river project be adopted by the council, the "dekinked" river would cut in a straight route past the cement company's tract, providing ideal dock frontage for unloading shipments of limestone and other materials, Mr. Smith asserted.

If no action is taken on the river program, the company will be compelled to slice off part of its property and dredge a section for its docks.

Location of the plant here, Mr. Smith said, would provide truck delivery of cement to contractors in the Cleveland area, saving them transportation charges and other costs.—*Cleveland Plain Dealer.*

Building Costs Relatively Steady

BUILDING COSTS appear to be relatively steady as the construction industry approaches the busy season for 1927. An index recently prepared by Greenebaum Sons Investment Co. reveals that building costs are about two points higher than this time a year ago but what upswing has occurred has been gradual, an advance of one point as shown in comparison with the midwinter level of 1925, while in comparison with 1924 the present cost level shows a decline of two points. In making the survey the year 1920 is taken as the base and is represented by 100. The costs in 1921 are shown to have increased to 112, which means an increase of 12% in comparison with the base year; in 1922 there was a decline to 82%; an advance followed in 1923 to 92% of the 1920 cost level; in 1924 there was another advance to a point 5% above 1920. The index for 1924 is 105, followed by 102 in 1925, by 121 in 1926 and by 103 in 1927.—*National Bulletin* of the Association of Building Employers.

Cement Pipe Plant for Mobile, Ala.

MOBILE, Ala., has been selected for the establishment of a $50,000 concrete pipe plant by the Faulkner Concrete Pipe Co., of which L. E. Faulkner of Hattiesburg, Miss., is president, according to information from reliable sources, and it is understood the enterprise will be located on a site on the state docks commission's industrial canal. This will be the first industry located on the state docks site.

Construction of the plant, according to information obtained, probably will be started within a short time. It will be equipped with thoroughly modern machinery.

Mr. Faulkner, president of the company, is also the vice-president and general manager of the Mississippi Central railroad.

Concrete Pipe Plant for San Antonio

THE Alamo Concrete Pipe Co., San Antonio, Tex., has completed a new plant. A. O. Neuman is president. The company has bought the land, six acres in fee, and had built a complete new plant with a floor space of nearly two acres, warehouses and all facilities needed, including a private spur track for loading and unloading freight cars. The machinery is the most modern on the market and the plant is newly equipped throughout so that it can turn out capacity production at minimum overhead.—*San Antonio* (Tex.) *Light.*

West Virginia Silica Sand Plants Reported in Early Merger

MERGER of a large number of silica sand companies operating in Morgan county, near Berkley Springs and Great Cacapon, W. Va., will likely be announced shortly, it was reported from reliable sources recently. The merger, it was said, will involve $10,000,000.

Several of the companies said to be concerned have been operating for 25 years and more furnishing sand for glass factories in the Pittsburgh district.—*Charleston* (W.Va.) *Gazette.*

News of All the Industry

Incorporations

Art Stone Studio, Inc., St. Louis, Mo., $50,000. By R. M. Ritter, 915 Olive St., and others.

Tucson Rock and Sand Co., Tucson, Ariz., $100,000.

City Quarry Co., New Britain, Conn., $50,000. By H. T. Sherman and others of New Britain.

Minerva Mining Corp., Wilmington, Del., $1,000,000. Deal in limestone, coal and copper.

Robinson Tile Marble Co. has increased its capital stock to $65,000.

Feltstone Co., Inc., Portland, Ore., stucco manufacture, has increased its capital stock to $50,000.

Acme Sand and Gravel Co., Cincinnati, Ohio, $15,000. By Russell, Joe, Tony and Frank De Salvo and Edwin G. Becker.

Cadot Sand Co., Columbus, Ohio, $25,000. By O. E. G. Winn, C. S. Heiston, C. E. Gwinn, H. L. Cadot and W. H Sharp.

Christner Gravel and Construction Co., Elkhart, Ind., $20,000. General construction. By Lester Truex, Charles F. Christner and Paul Christner.

Acme Sand and Gravel Co., Albany, N. Y. By C. R. Watson of Albany, C. O. Eaton, H. and G. M. Shapiro.

Independent Crushed Stone Co., Jacksboro, Texas, $30,000. By W. T. Spirey, E. A. Gwaltney and W. W. Hyde.

Hawkeye Material Co., Iowa City, Iowa, $50,000. Deal in sand and gravel. C. E. Thomas, president; A. A. Miller, secretary.

Sumter Lime Rock Co., Orlando, Fla., $10,000. By Charles S. Stewart, Fred S. Scott and E. Stewart.

O. N. Wolff Co. Inc., Spokane, Wash., $30,000. To manufacture and deal in all kinds of artificial stone.

Art Stone Manufacturing Co., Detroit, Mich., $12,000, is establishing plant at 12821 Hillview Ave.

Lannon Lumber and Supply Co., Milwaukee, Wis. To manufacture and sell cement blocks, building materials, interior woodwork, sash and doors.

Asbestos Roofing Co., Milwaukee, Wis. To manufacture and job roof materials, asbestos coverings. By Victor Meyer, Maurice Goldberg and Ida J. Hanft.

F. Hartung Co., Wauwatosa, Wis., $15,000. Deal in gravel, crushed stone and excavating. By Walter Hartung, Frank A. Raasch and John F. Taylor.

South Lakewood Sand and Gravel Co., South Lakewood, N. J., 500 shares no par. Deal in sand and gravel. By Wilfred B. Jayne, Jr., of Lakewood.

More & Moore Sand and Gravel Co., Vernon, Texas, $20,000. By R. L. More, R. L. More, Jr., of Vernon; C. W. Moore and T. C. Moore of Chillicothe. Main office at Chillicothe.

Magnesite and Gypsum Products Corp., Calliconeck Road, Little Ferry, N. J., $100,000. Manufacture magnesite, stone, brick, building products, etc.

Holliston Trap Rock Co., Milford, Mass., $100,000, by 1000 shares at $100. Quarrying. Frank P. Decrow, president; Leslie A. Eames of Holliston, treasurer, and Benny Rosenfeld.

Arkansas Gravel and Rock Co., Marion, Crittenden county, Ark., $25,000. H. A. McGee, president; C. B. Nance, vice-president, and J. A. Redding, secretary-treasurer.

Standard Silica Corp., Wilmington, Del., $100,000. Deal in sands, silica and silex. By J. R. Davis, B. T. Biggs, M. J. Joyce. (N. P.) Lawyers Corp. Co.)

Craftstone Co., of Asheville, N. C., 1000 shares no par. Manufacture and deal in artificial stone. By C. W. Campbell, C. Curry and A. V. B. Roberts, all of Asheville.

Superior Earth Co., Orlando, Fla., $20,000. Deal in fuller's earth. By C. C. Ruprecht, 211 Grace St.; L. R. Cambron, Autery Arcade; J. H. Gardner.

Hugh O'Haire Co., New York City, N. Y., $10,000. Deal in lime and cement. By F. and I. Colosino, H. O'Haire, (Filed by F. X. Conlon, 601 Tremont Ave.)

William J. McCormick Sand Co., New York City, N. Y., $100,000. By A. J. Conlon and J. L. Diamond. (Filed by J. A. Byrne, 305 Broadway.)

Rapid Hardening Portland Cement Co., room 818, 134 N. La Salle st., Chicago, Ill., $100,000. Manufacture and deal in cement of all kinds, lime, limestone, etc. (Tyrrell, Higgins and Jamieson.)

Midwest Concrete Pipe Co. increased capital stock from $100,000 to $200,000. Correspondent: Frank Novotny, care Illinois Concrete Sales Co., 139 N. Clark St., Chicago, Ill.

American Bentonite Corp., New York City. $500,000. Mining license concession, minerals and mineral lands. By A. M. Rossman, 1412 Edison Bldg., Chicago, Ill.

L. D. Tocci Granite Co., Inc., Quincy, Mass., $12,000, 120 shares at $100 each. Deal in granite, etc. President, Loretto D. Tocci; treasurer, Henry C. Smalley, 84 Penn St., Quincy, and Angus D. Martiin.

New England Rock Excavating Co., Boston, Mass., $10,000, 100 shares at $100 each. Deal in granite, rock, etc. President, Albert J. Welch; Stephan J. Boylan of 41 Pearl St., Newton, treasurer, and Howard W. Cole.

Colored Cement Mfg. Co., 133 W. Washington St., Chicago, Ill., $25,000. Manufacture and deal in cement and chemicals used in the cement industry, tile, etc. By A. R. Stone, Zophen L. Jensen, Edgar L. George. (Correspondent: Cochran & George, suite 605, 35 N. Dearborn St.)

Antique Royal Terrazzo Corp., 8439 South Chicago Ave., Chicago, Ill. Manufacture and deal in marble, mosaic terrazzo, building materials, etc. By Gus Pihos, Gertrude R. Dorfman, Richard Hill, Jr. (Correspondent: Frank Ingraffia, suite 610, 123 W. Madison St.)

Havlik Stone Co., 181 Woodlawn St., Aurora, Ill., $60,000 and 2,000 shares no par. Manufacture and deal in building material, engage in general construction. By Robert F. Havlik, Ida S. Havlik, James D. Benbow. (Michell, Gunsell & Allen, First National Bank Bldg., Aurora.)

Benson Concrete Co., 5103 W. Lake St., Chicago, Ill., $50,000. Deal and manufacture concrete and cement foundations, floors, walls, bases, urns, partitions, etc. By Olof Benson, Olivia Johnson, Carl H. Johnson. (Correspondent: Elmer W. Arch, 30 N. La Salle St.)

Quarries

Batesville Marble and Quarries Co., Batesville, Ark., recently took over Pfeiffer Stone Co., developing quarry B. John Cargill, Mgr.

Dolcito Quarry Co., Birmingham, Ala., set off an 11-ton blast of Atlas and Grasselli dynamite placed in 17 holes about 25 ft. back from face, bringing down about 135,000 tons of rock, it is reported.

Colorado Marble and Stone Co. has just sold its business and quarry to the National Resources Development Co. of Denver. The deal involved the travertine quarry at Wellsville, the only one in the United States. The product will be marketed on a nation-wide scale soon, states Mr. Hays, western representative of the development company.

Stayton, Ore., rock crushing plant is to be electrified at a cost of about $8,000, it was announced by the county court recently.

Tufa Building Stone Co., Los Angeles, Calif., has given notice of its purchase of the Flagstaff, Ariz., red sandstone quarry on the main line of the Santa Fe, and just east of the city. They will reopen, equip and start operations soon.

Sand and Gravel

Whatcomb County, Wash., sand and gravel pits are to have new bunkers. Bids are being taken for their construction and for a cableway dragline for rock hauling by Fred C. Reeves at Bellingham, Wash.

Fred Waken & Son's tractor house and dragline equipment at their gravel pit south of Madison, Wis., are reported to have been destroyed by fire.

The Diamond Gravel and Lumber Co., Murfreesboro, Ark., has let the contract for the mechanical equipment for its gravel washing and screening plant to Cunningham Machine Works, Inc., 1529 Texas Ave., Shreveport, La.

The Texas & Pacific Railway Co. opened a new gravel pit recently near Roanoke, Texas, from which it will produce about 100,000 cu. yd. for ballast on the line between Whitesboro and Texarkana. Operations will extend over several months, it is said.

Wolf Creek Sand and Gravel Co., Delight, Ark., began operations recently. From 12 to 15 cars are being shipped daily, it is stated. Large rock is being used by the Missouri Pacific and the smaller gravel is shipped to Louisiana for highway construction.

Union Rock Co. of Los Angeles, Calif., has just taken over the lease of the Kavanaugh & Twohy Rock Co. on 50 acres of city property in Orange, east of East Chapman Avenue bridge, along Santiago Creek, together with all equipment, for the stated sum of $100,000. No change in plant personnel is considered at present.

North Loop Gravel and Sand Co., Inc., San Antonio, Texas, has opened a new plant with estimated daily output of 400 tons washed sand and gravel. E. V. Biles, president-manager.

Cement

International Cement Corp., New York, is planning the addition of a fifth kiln with the accessory grinding and power equipment to its Cuban cement mill at Mariel. The directors of the company have also authorized the purchase of additional marine equipment for transporting cement. The work, it is stated, will be started in time to make the added production available about August. The mill at the present time is furnishing about 6000 bbl. per week to the Cuban government for use in the extensive public work program. The company recently announced that it closed a contract with the Cuban government for its entire cement requirements for the next four years.

Beaver Portland Cement Co., Gold Hill, Ore., has added another kiln at that plant, increasing the daily output from 1000 to 1600 bbl. per day. Other construction at Gold Hill and Marble mountain will go forward at once and will involve the expenditure of the remainder of a $400,000 improvement budget appropriated last year.

San Antonio Portland Cement Co., San Antonio, Texas, will open bids soon for the construction of a two-story, concrete and steel, clinker shed costing approximately $75,000. The new building will be added to their Cementville plant. W. E. Simpson Co. are engineers for the project, it is reported.

The above company also extended an invitation to the San Antonio Traffic Club for an inspection tour and barbecue at its Cementville plant recently.

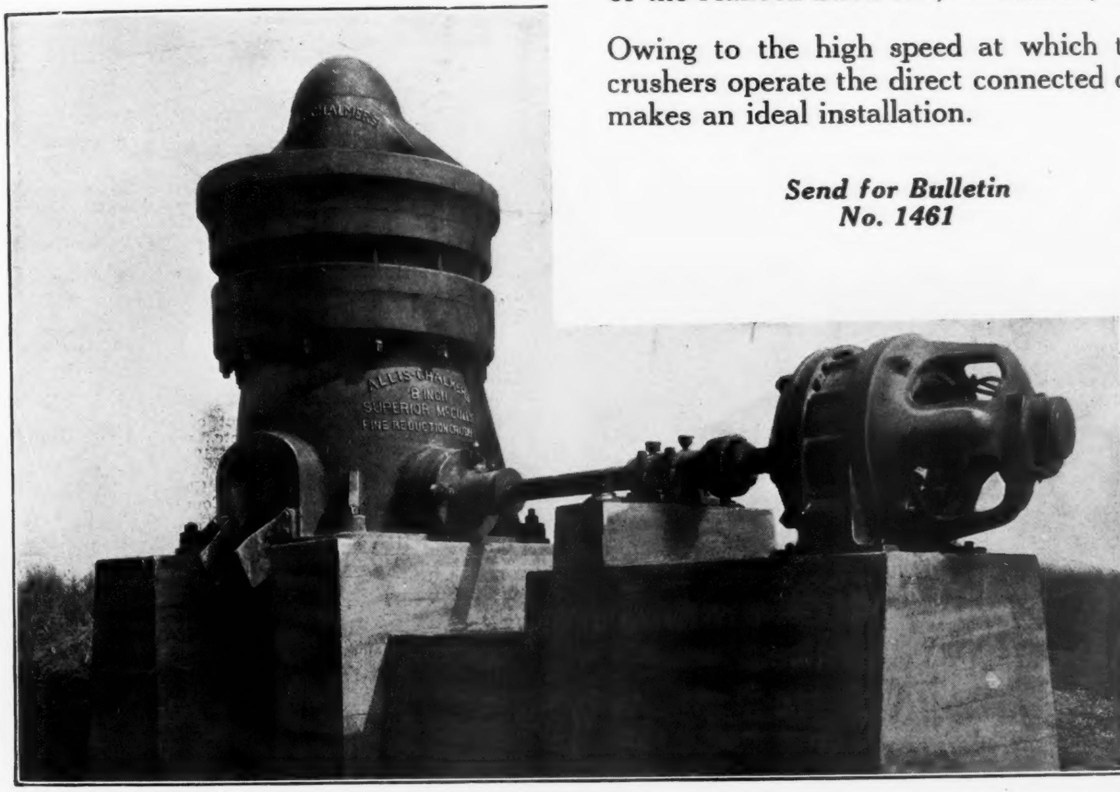
Louisville Cement Co., Louisville, Ky., tendered a banquet to about 200 general masonry contractors and builders at the Hotel Peabody recently. J. H. Malon, sales manager for the company, was principal speaker, and A. D. White, field representative, was in charge of arrangements. A program of singing and dancing was thoroughly enjoyed.

Trinity Portland Cement Co., Santa Fe Bldg., Dallas, Texas, is reported to have let contract for 600-ft. wharf to Don Hall Construction Co., Cotton Exchange Bldg. David M. Duller, consulting engineer, Second National Bank Bldg., is in charge.

Superior McCully Fine Reduction Gyratory Crusher

The most successful secondary gyratory crusher on the market today

Allis-Chalmers 6-in. Superior McCully Fine Reduction Gyratory Crusher direct connected to an Allis-Chalmers 50 H.P. Type ANY slip ring motor at 600 R. P. M. installed in the plant of the Hallock Sand Co., Columbus, Ohio.



Owing to the high speed at which these crushers operate the direct connected drive makes an ideal installation.

Send for Bulletin No. 1461

SIZES, CAPACITIES, HORSE POWER AND WEIGHTS

Size of Crusher in Inches	Two Feed Openings, Size Each in Inches	Capacity Per Hour in Tons of 2,000 Pounds — Size of Discharge Opening in Inches												Driving Pulley		H.P. Required	Weight of Crusher in Pounds
		¾	⅞	1	1¼	1½	1¾	2	2¼	2½	3	3½	4	Size in Inches	R.P.M.		
6	6x40	24	28	32	40	48								36x12½	500	40 50	32,000
10	10x52					80	94	107	120	135				36x18½	450	75 100	64,000
18	18x68									250	300	350	400	44x25	400	200 250	182,000

ALLIS-CHALMERS

MILWAUKEE, WIS. U. S. A.

Cement Products

Stone-Tile Co., Columbia, S. C., has signed a contract with the National Stone-Tile Corp., securing the manufacturing agency for "stone-tile" hollow concrete brick in Columbia and the adjoining territory. New plant is to be located at 716 Divine St. and H. P. Knowles, formerly of Sumter, will be manager. Plant will be in operation about April.

W. D. Haden, Inc., Houston, Texas, is moving South End retail yard to new location, doubling its capacity, and adjoining this have just completed the installation of a stone-tile plant with capacity 6000 units per day.

Urnite Manufacturing Co., Inc., Austin, Texas, plans the erection of a building on Port Road to develop patented synthetic stone for manufacture of urns, benches, fountains, etc.

Benedict Stone Corp., Baltimore, Md., subsidiary of Benedict Stone Corp. of New York City, acquired plant of Linthicum Stone Corp., Montford Ave. and Boston St.; will either enlarge or erect new plant.

Albert A. Guiste has purchased from Lloyd & Oakley the Dinula Cement Pipe Works in Dinula, Calif.

California Stone Tile Co., 440 S. San Fernando Road, Glendale, Calif., is about to erect stone tile sheds at 12325 Sherman Way, San Fernando Annex of Los Angeles, Calif.

Gypsum

Atlantic Gypsum Products Co., Boston, Mass., will begin operating the extensive gypsum deposits at Cheticamp, Cape Breton, Nova Scotia. A modern conveyor system and a railroad spur between the quarries and the harbor docks have been put in. Mining will begin this month.

Plastoid Products Co. has just shipped an entire trainload of a new mineral base wallboard. R. M. Greenleaf, vice-president and general manager of the company, claims that it is an innovation in the construction field and that the wallboard is waterproof, fire-resistant, soundproof, and impervious to climatic changes.

Gyp Hill properties near Falfurias, Texas, has been connected with the main line of the Southern Pacific Railway by a spur and additional machinery, including a large washer, is being installed there. Shipments will begin as soon as installation has been completed. Gypsum deposit here is said to be almost inexhaustible.

Windsor Gypsum Co., Windsor, Ont., will soon receive bids for the construction of a refinery and storage bins of 100,000 tons capacity. Estimated cost, $305,000. Complete machinery for refinery will be required.

Lime

Chemical Lime Co. and Centre County Lime Co. will present arguments against the Bellefonte Central Railroad Co., charging unjust rates on transportation of lime between State College and other points in the state of Pennsylvania.

Batesville White Lime Co., Batesille, Ark., contemplates erecting one or more new kilns at Limedale, Independence county.

Agricultural Limestone

Oregon State Lime Plant has received pooled orders for ground limerock from the alfalfa farmers of Washington county to the amount of about 300 tons, it is reported.

Silica Sand

Cape Silica Co., Cape Girardeau, Mo., reported, acquired old National Mining Co.'s property; establish modern plant to handle clay products; property now being cleared; new plant to cost $80,000.

The Christophel Art Stone Co. of North Milwaukee, Wis., has opened a sales office in the Colby Abbott Bldg. at 445 Milwaukee St., Milwaukee, Wis.

Personals

G. S. Brown, president, Portland Cement Association and the Alpha Portland Cement Co. of Easton, Penn., and Chicago, Ill., on his first visit to California in eight years, accompanied by Mrs. Brown, C. A. Irvin, vice-president of his company, and Mrs. Irvin, is making it a combined business and pleasure tour of the Pacific Coast states. Mr. Brown was very much impressed by the general use of cement in the buildings, highways and homes of Los Angeles, and he commended the program for constructing systems of wide permanent trunk highways to relieve the congested traffic situation of the present-day big city. He also stated that southern California leads the country in use of cement for city streets and is in the front rank in the building of paved highways, most of them being constructed of cement concrete.

Stapleton D. Gooch, general manager of the Diamond Sand Co., Lake Wales, Fla., one of the largest industries of its kind in the South, has been named president of the Lake Wales Chamber of Commerce.

A. Burton Cohen, New York consulting engineer, was awarded the annual L. C. Wason medal at the close of the 1927 convention of the American Concrete Institute. This single honor was for the most meritorious paper presented to the 1926 convention. Mr. Cohen's paper was entitled "Correlated Consideration in Design and Construction of Concrete Bridges."

A. B. Cohen

Mr. Cohen since his graduation from Purdue University has been active in designing and engineering activities, principally in concrete bridge construction. In 1920 he left the D. L. and W. R. R. Co. to establish himself as a consulting engineer, specializing on concrete construction. His most recent achievement was the design and supervision of construction of the Hudson county boulevard bridge over the Pennsylvania railroad at Journal Square, Jersey City. A description of this work, embodying details of design and construction features, was the basis of the paper for which the award was made.

Henry M. Robinson, president of the First National Bank of Los Angeles, was elected a director of the General Electric Co. at the meeting of the board in New York on March 25. He is the first man west of the Mississippi to be elected on the General Electric Co. board of directors.

G. V. Gladville and Walter O. Brassert of the Concrete Silo Co. of Bloomfield, Ind., have consummated a deal whereby they will take over the controlling interest of the Cement Products Co., an institution that has been operating at Worthington, Ind., for a number of years. Part of the holdings in the Worthington plant which was purchased by the Bloomfield men was stock formerly held by Mr. Hodges, John Stahl and Douglas Stahl of Worthington and Cyrus E. Davis of Bloomfield.

Mr. Gladville said that future plans regarding the operation of the Worthington plant had as yet not been definitely determined. However, no changes of any moment are contemplated at this time. The plant and office will continue to operate as heretofore.

The two Bloomfield citizens, Messrs. Gladville and Brassert, are well known, progressive business men who have made the Bloomfield plant one of the most successful institutions in that city, and the products of their concern are known over a wide area of the nation.

L. J. Capen, vice-president, the Dewey Portland Cement Co., Kansas City, Mo., recently sold his Crestwood home, 5433 Cherry St., to B. R. Nelson, president the Kansas City Electrical Construction Co., for a reported sum $15,750. Mr. Capen is leaving to take charge of sales at the new Dewey plant at Davenport, Iowa.

Harry V. Croswell, works manager of the Oakfield plant of the United States Gypsum Co., has been made manager of mines and transferred to the Chicago offices. In this capacity he will have charge of all the company's mining developments. J. R. Davis, works manager at the plant and mines at Gypsum, Ohio, succeeds Mr. Croswell at Oakfield.

Obituaries

William B. Allen, formerly president of the Casco Sand and Gravel Co. and an official of several Green Bay manufacturing concerns, died March 8 at his home in Aurora, Ill.

James W. Burroughs, for many years general manager of the Le Grand Quarry Co., Ottumwa, Iowa, died at his home on March 14 of pneumonia. His death was sudden, although for the past 16 years he had been an invalid, suffering from paralysis of one side induced by an apoplectic stroke.

J. W. Burroughs

Mr. Burroughs was born in Virginia on October 9, 1850, and spent his early days in a small town near Norfolk. In 1867 he came to Iowa, settling at Stuart, later moving to Lynnville, where he married. His connection with the Le Grand Quarry Co. dates back to 1888, when he took charge of a flour mill operated by them at Oakes, N. D. A short time after, Mr. Burroughs became active in the quarry end of the company and after several years in the sales department became general manager, which position he held until the company sold the quarries to the Chicago and Northwestern R. R. Co.

Mr. Burroughs was the last of his father's family. His wife died recently and surviving their father are the two daughters, Mrs. Williams and Mrs. Harper. Funeral services were held from Mrs. Williams' home on March 18.

OWNERSHIP OF ROCK PRODUCTS

Statement of the ownership, management, circulation, etc., required by the Act of Congress of August 24, 1912, of ROCK PRODUCTS, published every second Saturday at 542 South Dearborn street, Chicago, Ill., for April, 1927, State of Illinois, County of Cook, ss.

Before me, a notary public in and for the state and county aforesaid, personally appeared Nathan C. Rockwood, who, having been duly sworn according to law, deposes and says that he is the manager of ROCK PRODUCTS, and that the following is, to the best of his knowledge and belief, a true statement of the ownership, management, etc., of the aforesaid publication for the date shown in the above caption, required by the Act of August 24, 1912, embodied in section 443, Postal Laws and Regulations, printed on the reverse side of this form, to-wit:

1. That the names and addresses of the publisher, editor, managing editor, and business managers are: Publisher, Tradepress Publishing Corp.; Editor, Edmund Shaw; Managing Editor, Nathan C. Rockwood; Business Manager, Nathan C. Rockwood.

2. That the owners of 1 per cent or more of the total amount of stock are: W. D. Callender, Nathan C. Rockwood, both of 542 South Dearborn street, Chicago, Ill.

3. That there are no bondholders, mortgagees, or other security holders owning or holding 1 per cent or more of total amount of bonds, mortgages, or other securities.

4. That the two paragraphs next above, giving the names of the owners, stockholders, and security holders, if any, contain not only the list of stockholders and security holders as they appear upon the books of the company but also, in cases where the stockholder or security holder appears upon the books of the company as trustee or in any other fiduciary relation, the name of the person or corporation for whom such trustee is acting, is given; also that the said two paragraphs contain statements embracing affiant's full knowledge and belief as to the circumstances and conditions under which stockholders and security holders who do not appear upon the books of the company as trustees hold stock and securities in a capacity other than that of a bona fide owner; and this affiant has no reason to believe that any other person, association, or corporation has any interest, direct or indirect, in the said stock, bonds, or other securities than as so stated by him.

NATHAN C. ROCKWOOD,
Business Manager.

Sworn to and subscribed before me this 24th day of March, 1927.

(SEAL) CHARLES O. NELSON.
(My commission expires April 13, 1930.)